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VOLUME XII JUNE 18, 1923 NUMBER 13

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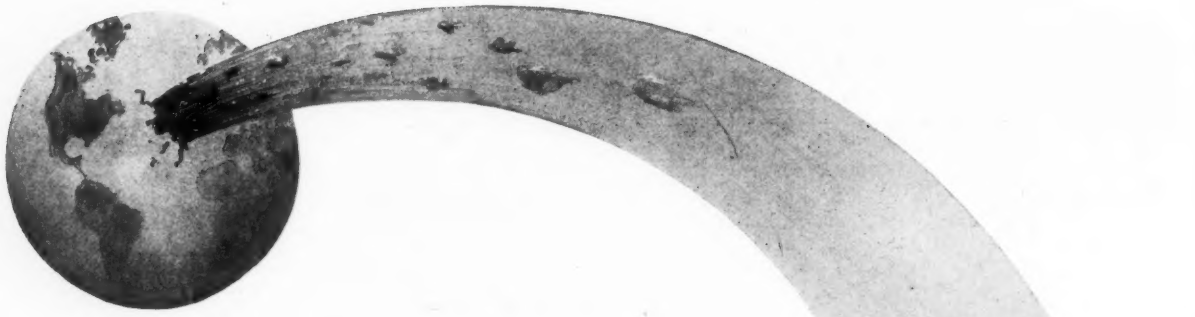

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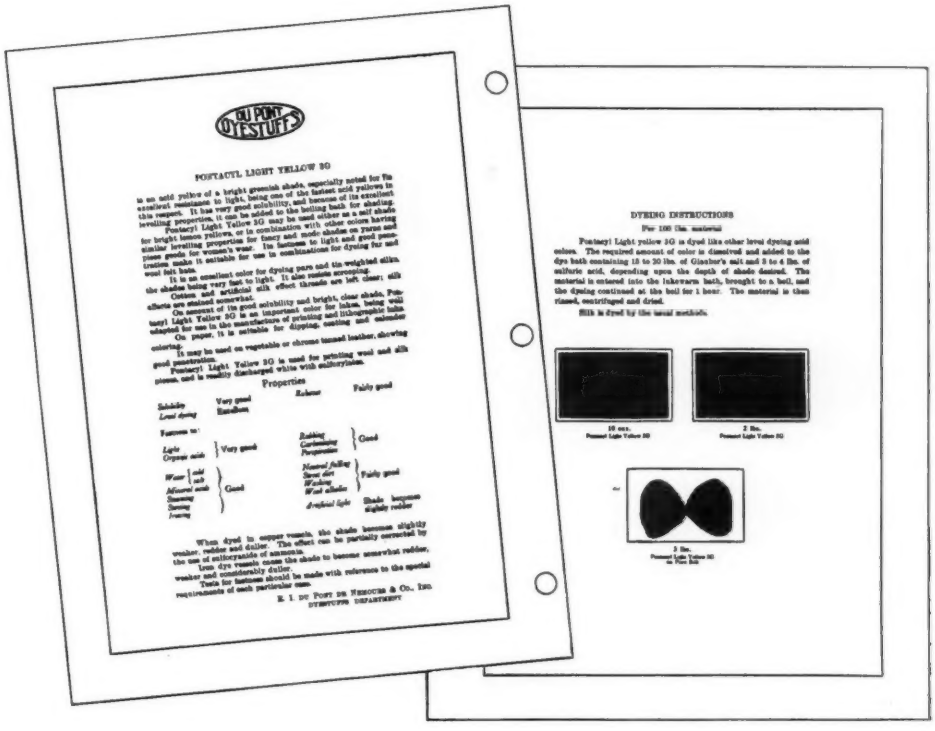

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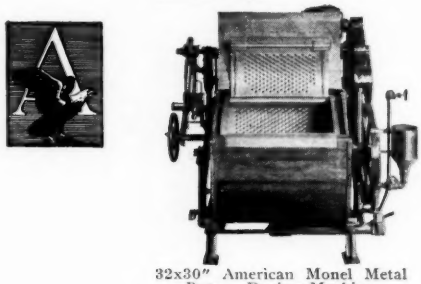

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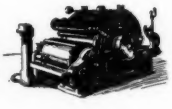

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VOLUME XII NEW YORK, JUNE 18, 1923 NUMBER 13

Notes on the Dyeing of Direct Blacks on Cotton Goods

Dyeing with Two Baths—Operation of Such a Plant—Advantages—Dyeing the Same Color Several Times —Large Scale Production—Dyeing Half Wool Fabrics in Full Width—Continuous Dyeing Machine

By RAFFAELE SANSONE

Dyeing with Two Baths

Part VI of this series appeared in the issue of May 7, page 343.

WHEN the half wool fabrics have to be dyed in two baths in chain form, two separate machines are employed constructed on more or less the same principle indicated in a preceding portion of this article, being treated generally first in the direct color and then in the acid coloring matter. In this instance the direct color is dyed at a low temperature, and often with a little weak carbonate of soda, whereas the wool is dyed with an acid coloring matter not dyeing in any way the cotton in the material.

Should it, however, be required to dye both the cotton and the wool of the cloth on one apparatus, the principle of this could be arranged as shown in *Fig.* 1.

This shows a modification of a dyeing and rinsing machine at present largely employed for the treatment of half wool fabrics in chain form. In the same the trough (V) has been divided into four compartments, the first and third of which are of somewhat larger width than the second and fourth. The first of such compartments contains the dyeing bath for the cotton portion of the material, the second a bath of clean running water for conducting a thorough rinsing of the material, the third the dyeing bath for the woolen portion of the fabrics, and the fourth or last a second rinsing bath of running water.

On vat V is placed a solid iron frame (G) that supports two heavy pitch pine pressure bowls (A and B), on which pressure is applied through a screw wheel (P). Above the upper bowl, and towards its extremities, are placed two narrow iron india-rubber covered rollers (C) that are loosely pressed on the said bowl through levers and weights (L). One of such rollers serves for the entrance of the chain of half wool cloth to be treated, whereas the other serves for its exit.

Below the pressure bowls (A and B) is placed a shallow enameled iron collection vessel or trough (F), divided into four compartments that correspond exactly with those of the vat (V) just below. The first and third of such compartments has a discharge tube delivering all bath falling from the pressure bowls into the original dye baths, whereas the second and fourth compartments have tubes leading out of the plant.

Before the pressure bowls (A and B) is placed a hexagonal distribution shaft (Z) supplied with several channels placed at regulated intervals down its whole length. In front of this is a tube (S), serving for spraying into the second and fourth compartments the baths necessary for the rinsing operations. At the back of the said bowls (A and B) is arranged a guiding roller and a separation frame (M).

The cloth (O) is entered above the machine on the right, and at its front, and after passing between the nip of the bowls (A and B) is caused to descend onto the hexagonal distribution shaft (Z), making its way down the curved bottom of the vat of treatment, where it is allowed to form a certain number of folds, then mounting, as shown by the arrow, through the separation frame (M) onto the small guiding roller already indicated, and again between the nip of the large pitch pine pressure rollers for descending and mounting again and again until reaching the opposite end of the apparatus. Here the chain of half wool cloth mounts either to be

joined to its beginning, or to make its exit as shown by the arrow at the back of the plant. For facilitating the work of the operatives in the above very ingenious plant the vat (V) of this is sunk to half its depth in the floor of the works, being embedded therein in a solid brick wall (X).

Operation of Plant in Fig. 1

The above plant can be worked either for dyeing both materials in continuous form only once, or for dyeing them over and over again. When worked for the first

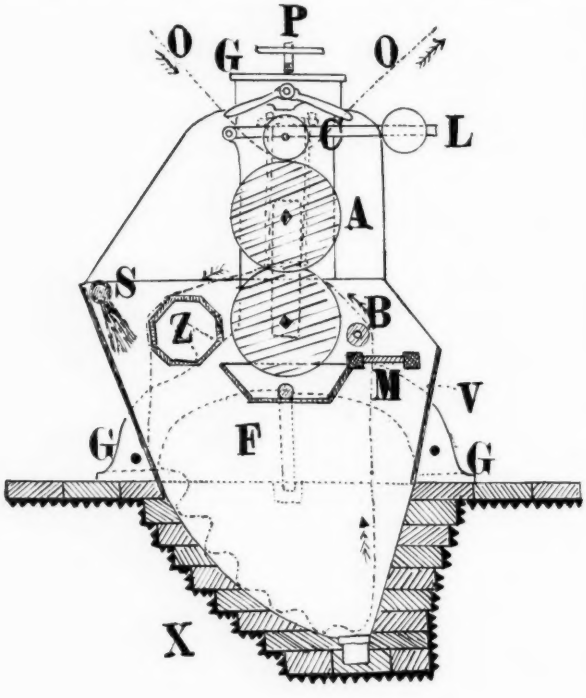

Fig. 1

purpose, the operatives enter a long woolen tape causing this to run through all portions where the half wool chain will later have to pass. After this they enter the two dye baths respectively in the first and third compartments of vat (V), opening on steam in the same in long closed serpentines, for bringing to a certain fixed temperature which is maintained later all through.

When the above has been conducted, a drop of each dye bath is caused to fall througgh a glass rod onto a clean piece of white filter paper and compared then in the laboratory with spots produced from samples of dye baths used for a preceding batch of half wool cloth. This is assuming, of course, that a same shade is produced several times in the works, a matter that often takes place nowadays. A sample of each dye bath is collected and kept in a hermetically closing glass stoppered bottle for future reference work or tests, if the baths have been found in correct order.

When the above spotting trials has been conducted, which takes but a few minutes, the beginning of the chain of half wool cloth to be dyed is attached to the tape already entered in the plant, and this last is placed in motion through switching on the electric current to the small motor used to drive it.

The material comes thus to pass many times through the first dye bath, being pressed strongly after each passage in order to expel all excess of bath, and to cause a thorough penetration. On leaving this compartment it is already dyed in the required intensity. The rinsing in water that follows extracts all coloring matter mechanically fixed on the cloth, which enters the second dye bath sufficiently clean to be evenly treated in this with the wool coloring bath. Here the chain of half wool material passes also many times through the bath and the wool is covered evenly in the required shade, requiring but little rinsing in the second running water bath that follows.

Advantages of the Plant in Fig. 1

The plant indicated above has several advantages of great importance, especially during these times of intensive competition and uncertainty. Some of these can be indicated as follows:

1. The chain of the half wool fabrics is pressed after each impregnation, obliging the dye bath to penetrate completely, even if the goods pass rapidly through the machine.

2. Through the arrangements in the shallow collection trough below the pressure bowls (A and B) all portions of the two dye baths that are pressed out fall back at once to these, avoiding any waste.

3. As all portions of the rinsing baths passed out make their way at once out of the plant, the action of the cleansing water is greatly increased. By introducing divisions in the two compartments reserved for this purpose, and running in each extra bath thus formed a separate supply of fresh rinsing water, it is possible to free the material of the presence of any carbonate of soda that may have been added in the dyeing of the cotton portion, avoiding the entrance of this in the bath conducting the coloring of the woolen portion of the material.

4. Through the continued passage of new material through the plant it is possible to obtain a sufficiently large production to answer many purposes within a comparatively short space of time.

5. Should it be necessary to change the dye baths without stopping the plant at the end of a batch just being finished, a sufficiently long tape is fixed to this, and when the same has entered the apparatus, and the cloth is out of the last dye bath, the two old dye baths are run off and their respective compartments are rapidly rinsed with clean running water, and fresh dye baths are introduced. In this way, as the end of the tape is reached, it can be employed to introduce the new lot of goods to be dyed.

6. The material being treated is in plain view all the way, and the dyers can even take samples for control manipulations.

7. By adding between two woolen tapes running through the plant a yard or two of the cloth to be dyed, it can be determined how the dye bath conducts this operation before starting the treatment on the whole batch. Such cases should, however, seldom take place with systematic working.

Dyeing the Same Color Several Times

Through the above plant it is also possible to dye the same fabric several times by tying together the two extremities of the material to form an endless band. In this way the half wool goods are first given a passage through the bath to dye the cotton portion only, and then through the bath to cover the wool. On leaving this, after the rinsing in the running water, they pass, however, again through the bath containing the colors for the cotton, and this is again covered, assuming a deeper shade.

On entering later for a second time in the acid bath for the covering of the wool, this is also dyed deeper; and on passing over and over again through the plant it is possible, with certain colors, to exhaust both baths, obtaining deeper shades than in continuous dyeing. The choice of the most suitable dyestuffs required in this instance, and the dyeing conditions required for each case, have, however, to be carefully studied.

Large-Scale Production

Should it be required to dye very large quantities of half wool cloth in chain form, the operation is conducted on several of these simultaneously, using for the purpose a continuous machine. Here the material is treated first through a long vat containing the color for covering the cotton portion, pressing several times to secure a better penetration, and using for the dyeing a much more concentrated solution than would be required with non-continuous methods of working.

This treatment is followed by a rinsing with running water on a second vat, by a second dyeing in a third vat, but with acid coloring matters, and by a second rinsing with water on a fourth vat, passing after this the goods straight away on a cylinder drying machine, and from here to the opening plant. The dyeing plant is sometimes used in conjunction with a suction apparatus for eliminating as much of the water present in the chains of half wool material as possible, before these pass onto the drying cylinders.

The above arrangement only allows the dyeing in one color per time, When this has to be changed it is necessary to stop the plant, run through tapes, cleanse the treating vats, and introduce the new dye baths; after which the dyeing operations can be resumed.

Dyeing Half Wool Fabrics in Full Width

Some works prefer to dye their half wool fabrics in full width, as they find that through this means it is not only possible to obtain uniform shades, but also to avoid the necessity of having to open out the material before the drying and finishing operations. A similar dyeing method is, however, often only of advantage when the material has been treated all through from the gray state in full width form, otherwise there is little

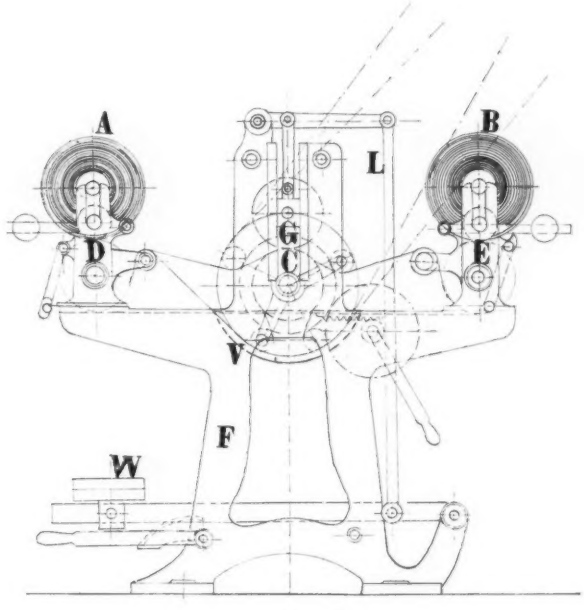

Fig. 2

convenience to open the material from chain form before the dyeing operations.

There is no doubt, however, that this form is undoubtedly the best for treating such goods, if only a proper plant can be secured for the purpose. This is not difficult to obtain, as the treatment of the goods in full width has been very thoroughly studied, and much experimentation and practical success in this direction has already been made. It is therefore only necessary to choose among the many plants at disposal the one best adapted to the requirements of the works, considering the scale of production, the nature of the colors or shades to be produced, the nature of the fabrics to be treated, and the local conditions, cost of labor, steam, etc.

Among the different means at disposal are the jiggers, the padding machines, the continuous dyeing machines, etc. The jiggers give excellent results for the treatment of many shades on numerous small lots of material, and for this purpose are to be found in most works dyeing half wool goods.

Padding machines are used in some special cases that differ, however, from the usual machine used for soaping purposes, for dyeing Aniline Black, etc., being often arranged for padding over and over again. A type of

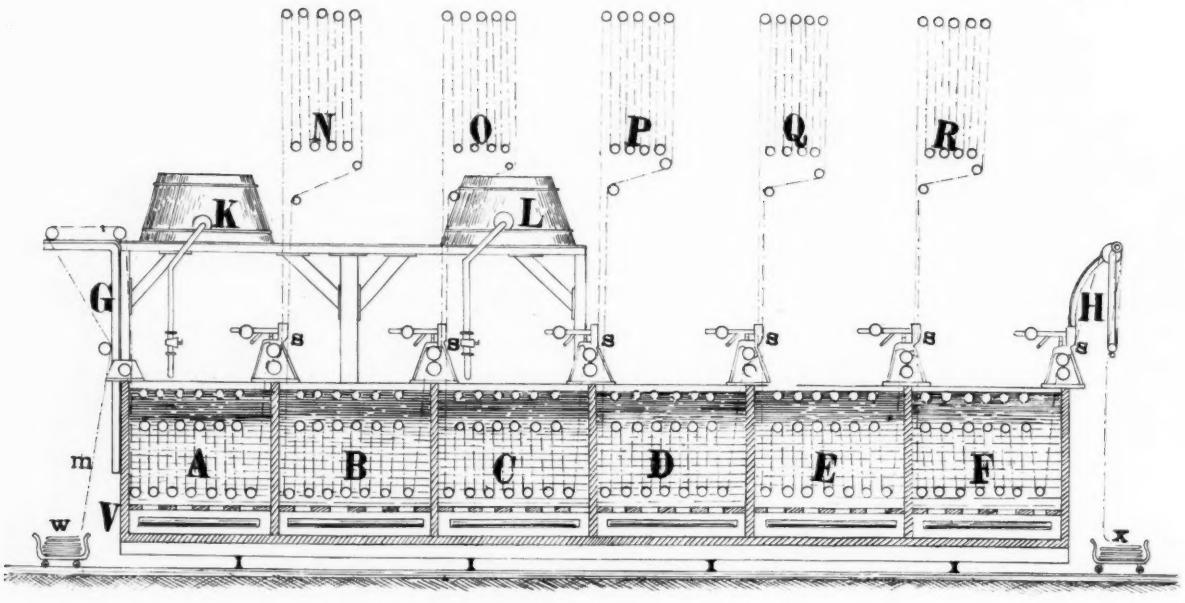

FIG. 3

plant used in this instance is constructed on the principle shown in *Fig.* 2.

This illustrates a strong, heavy, iron structure (F) of very peculiar shape, and supporting on its upper portion a pair of pressing cylinders (C and G), kept under an elastic pressure through levers (L) and weights (W). Under the lowest of such rollers is fitted an enameled iron trough (V), supplied with a closed steam coil and two narrow diametered guiding rollers which can be raised or lowered automatically during the entrance or exit of the half wool fabric being treated.

The squeezing rollers (C and G) contain at one side a disposition (D) through which the cloth can be wound on a wooden shaft (A), or unwound from this as may be required. At the other side of the said rollers is another disposition (E) equal to the first in every detail, and through which the cloth can be wound or unwound on another wooden shaft (B).

It is through these two devices that the material, passed between the nip of the squeezing rollers (C and G), and below the two guiding rollers, is caused to run backwards and forwards in the dye bath contained in the vat indicated by V. The above plant, although certainly very ingenious, only allows, however, a reduced production, and is really of value only for certain special classes of goods.

THE CONTINUOUS DYEING MACHINE

The dyeing of half wool fabrics on the continuous dyeing machine, although not very largely practised at present, will undoubtedly be additionally developed in the near future, especially as there is a marked tendency to place on the market large quantities of cloth dyed in comparatively few colors, these colors being nearly always based on the shades that are fashionable at the time.

The number of plants available in this instance are exceedingly numerous; the working principle adopted is, however, always more or less the same, being based principally on treating the half wool goods in a series of vats where they are caused to pass through a series of vats containing two dye baths and two rinsing waters, the length of which is regulated in accordance with the time the material is to remain in contact with each bath.

Many of such plants possess the defect that the material has to be treated in both dye baths at the same speed, when in some cases it might be of advantage either to conduct the dyeing more rapidly with the direct colors than with the acid colors, or vice versa. For the accomplishment of this a modified plant constructed on the principle shown in *Fig.* 3 would offer great advantages.

This consists of a large iron vat (V) lined inside and outside with glass, and divided through partitions into six compartments (A, B, C, D, E, F), each of which is supplied with a perforated double bottom, a closed steam coil for all heating operations, a lower fixed series of guiding rollers, and an upper series of guiding rollers. This last can be raised gradually to an upper position whenever required through a special disposition in the plant.

At the end of each compartment is fixed a pair of squeezing rollers, indicated in each case by (s), whereas, the beginning of the vat has a special entrance frame (G), through which the half wool pieces (m) are entered in a spread condition from a small iron wagon (w). At the end of the same vat is a plaiting arrangement (H) that sends the wet treated fabric on another small wagon in the form of pieces.

At the back of the three first compartments (A, B, C)

is arranged a raised platform at a certain height, to which the workmen have access through a wooden or iron stair, and on which are placed the two half tubs (K and L) for the preparation of the two dye baths. Each of such half tubs has a long tube fitted to its bottom ending in a tap.

At a few yards above the whole plant are arranged five separate double series of guiding rollers (N, O, P, Q, R), which can be set at any required distance from one another for a certain interval. On these, several pieces of the colored or rinsed material can be deposited whenever required.

Operation of Plant in Fig. 3

The above plant can be worked differently in accordance with the colors dyed, and the nature of the fabrics treated. In those cases where it is necessary to treat the half wool cloth for a longer period of time in the direct coloring matters than in the acid, the operatives arrange the plant so that the double series N and O are as near as possible, and arrange the upper guiding rollers in compartments A and B as low as possible.

They then enter a tape through the plant, and prepare the two dye baths in the half-tubs (K and L), emptying a portion of these in compartments A and C respectively. After this they fix at the end of the tape the beginning of the cloth to be treated, and start the plant. The half wool cloth is thus carried forward slowly through the dye bath in compartment (A), containing the coloring matters that are only to color the cotton portion, rising later above this plant on N, which is brought to its strongest development. From here it then descends in a cold water rinsing bath contained in compartment B, while the upper guiding rollers are being raised to the uppermost position.

After this the cloth passes on the guiding rollers of the disposition O, that absorb another strong portion of the same, and when this enters in compartment C, the rollers of which run quicker than in A and are closer, it can be drawn forward without hindrance, while the upper rollers in compartments A and B, and those of the collection dispositions N and O are slowly descending. In this compartment the wool portion of the material is dyed.

The upper rollers of the dispositions (P, Q, R) and of the rinsing vats (D, E, F) are raised or lowered automatically in accordance with the requirements of the plant.

When no further descent of the rollers is possible, a point that should never be reached with a carefully arranged operation, a blank piece is run through the plant at A, distancing, at the most convenient moment, all upper rollers. On running through the next three compartments (D, E, F) the material is rinsed in clean running water.

Another Case

When dyeing some half wool fabrics it may be necessary to pass the goods more rapidly through compartment A, as this contains either direct coloring matters that have to be more rapidly dyed than the acid colors, or acid coloring matters that are to be followed by more slowly dyeing direct colors for covering in part the cotton and in part the wool.

In this instance the two series of guiding rollers in compartment A are brought quite close together and the cloth is passed on dispositions N and O with their rollers also quite close together; that are then gradually distanced for absorbing as much material as possible when this initiates its entrance in the dye bath for the cotton. In this instance the dyeing with the direct coloring matters is conducted in vats C, D, E, using only compartment F for the rinsing operations, and causing the bath entering in compartment C to pass also through compartments D and E. Also in compartments C, D, E, the dyeing operations are initiated with the upper rollers as low as possible, and during the course of the dyeing these are gradually raised.

Advantages of Plant 3

Some of the advantages of the above plant can be considered as follows:

1. Through the special construction of the compartments these can be employed all for treatment with hot baths should this be necessary.

2. Through the upper cloth collecting dispositions, and the possibility of treating more slowly or rapidly in the compartments themselves, it is possible to dye, during the running througgh of the half wool fabrics, for more or for less time the cotton or wool in the same, in accordance with the constitution of this, the nature of the dyestuffs employed, and the temperatures used for the different treatments.

3. Through the special disposition of the plant it is possibl to dye both the cotton and the wool with direct coloring matters.

4. Owing to the possibility of changing the position of the tube fixed to the lower portion of the half-tu', (L), where the second coloring bath has been prepared, it is possible to run this into the fourth compartment (D) instead of the third (C), using the first two compartments (A and B) for the dyeing with the direct coloring matter, conducting this at any required temperature, or even in the cold; and employing compartment (C) for the first rinsing, compartment (D) for the dyeing with the acid coloring matters, or with other direct coloring matters, in accordance with the shades to be produced, to the contents of the baths, and to the temperatures adopted.

5. By introducing a waste piece in the plant it is not necessary to stop work when introducing new dye baths, for during the passage of the same through compart-

ment (A) the bath there can be changed, giving an intermediate rinsing with water before the introduction of the new batch of material to be treated. It is possible to change all following baths with the greatest ease, even if these are represented by two or more dye baths, thus employing the plant, not only for dyeing very large batches of cloth in the same shade, but also for dyeing several small lots or batches in different colors.

6. By causing the collection devices to bring the cloth in an upper chamber containing the heat rising from the plant being worked, or heated through the escape steam coming from the serpentines heating the different baths, it is possible to give the cloth a partial or total drying before passing from bath to bath, using in this instance for the dyeing of the cotton—and possibly also far a partial dyeing of the wool—the two first compartments (A and B), for the rinsing the third compartment (C), and for completing the dyeing of both materials the two following compartments (D and E), leaving only the last compartment (F) for the final rinsing operations. In this way weaker baths can be employed obtaining deeper shades without using salt.

7. Lower baths can be used when treating more rapidly the woolen or the cotton portion of the half wool cloth, leaving out completely the upper cylinders.

Neps in Cotton Fabric and Their Resistance to Dyeing and Printing

Examination of Faults Submitted—Notes—Streaks—Gray Cloth—Effect of Mercerization on Color of the Neps—Cell Wall Thickness of Cotton Hairs—Production of Neps During Manufacture—The Botanical Aspect—General Considerations—Summary

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The British Cotton Industry Research Association

(*Transactions of the Textile Institute, published in the Journal of the Institute*)

Introduction

THE occasional occurrence in cotton fabrics of hairs which resist dye and remain white has been known for some time. As early as 1848, attention was called to it by M. Daniel Koechlin-Schouch[1] of Mulhouse, and he suggested that unripe cotton was responsible for the defect. The question was investigated by Crum,[2] and at a more recent period Haller[3] and Herzog[4] have made contributions to our knowledge of the subject.

Crum found the undyed portions of the cloth to consist of hairs with remarkably thin and transparent blades, readily distinguishable from ordinary cotton by their perfect flatness and by their uniformly great transparency. The ribbon width was seen to be greater than that of normal hairs and to show numerous longitudinal and transverse folds. Searching among the motes rejected by the "picking machine," he found what appeared to be the same type of hair, in the form of small matted tufts of silky luster, several of which enclosed the fragment of a seed or, occasionally, an imperfect seed. Crum noticed that small tufts did sometimes pass the sifting process of the "picking" machine, ultimately appearing in the cloth as minute lumps or knots, and showing white in the dyed fabric. An examination of specimens of dried bolls enabled Crum to trace the real nature of the thin-walled hairs, and to make the following observations:

1. The contents of capsules unopened and slightly opened consisted of thin-walled hairs'* or, as Crum called them, dead cotton fibers.

2. In more fully developed capsules, the ordinary cotton appeared where it had pushed its way out. Seeds nearer the calyx in the same loculus were clothed with the solid mass, chiefly consisting of the glassy, though transparent, hairs.

3. The glassy hairs frequently appeared in pods of ripe cotton in discolored spots, manifesting signs of injury before maturity.

4. Small portions of dead cotton were seen, though rarely, in the outer part of the wall of well-clothed and ripe cotton seeds.

5. Small glazed tufts in cotton bales, appearing to have separated from the stem through which they derived nourishment, were of frequent occurrence.

Crum pointed out that a distinct gradation is perceptible under the microscope in different specimens, ranging from dead to normal. He stated that the glassy hairs correspond with the cellular membrane, which was described by the earlier botanists as a primary formation in young plants, possessing a considerable degree of toughness and a certain amount of elasticity, having no perceptible orifices, and yet readily permeable by water.

The dead cotton was observed principally in styles

(*Continued on page* 473.)

*From the botanical point of view, the term "cotton hair" is preferable to "cotton fiber."

Right of Courts to Review War-Time Acts May Affect Decision in Dye Patent Suit

Federal Judge Morris States His Doubts—Frank L. Polk Testifies He Knew All About Foundation Before Authorizing Sale—If Government Wins, Patents Revert to Germans, Defense Contends—U. S. Counsel Credits Those Concerned in Sale With High Motives

WHETHER the 4,800 seized German patents were worth the $250,000 paid for them, or the $100,000,000 which the Government estimates as their real value, had not been decided when this issue of The REPORTER went to press, but the first ten days of the trial before Federal Judge Hugh M. Morris in the U. S. District Court at Wilmington, Del., saw many setbacks to the Government's efforts to show that legal fraud was committed and that the patents should be returned.

One of the outstanding and, to many, unforeseen features of the case, was Judge Morris's repeatedly stated belief that his own or any other court has no power to review a question of the executive discretion of the President of the United States during war time. Last Friday he stated for the benefit of the plaintiff:

"The Executive Department or branch of the Government, acting under a power conferred upon it by Congress—we will assume the existence of this power for this question—determines that a condition has arisen under which the country will be greatly benefited, and possibly its independence preserved, by a specific act, namely, by the sale of these patents for a sum of $250,000 to the Chemical Foundation, Inc., that thereby, should future wars arise, they will be in a position to be independent chemically from any foreign power; that America will be in a position to develop the chemical sciences commercially, and thus put it in a position to have the Government better protected than it would be if the Government directed only its own energy to the development of the chemical sciences; and that there could be no question, viewed from that standpoint, but that this disposition of the patents was the wisest one possible.

"Then do you contend that the Executive was required to offset this against that the number of dollars and cents under this act?"

COURT SEES QUESTION OF REVIEW RAISED

Again, on another occasion, Judge Morris said:

"I do not see how it is possible for me, unless these documents bring it clearly before me, to determine what was for the best interests of the country, if that power existed. If you establish that in the exercise of the power and of the trust it was the Executive's duty to obtain the highest possible dollar for the patents, of course, that is a question that may possibly be determined, but when you concede, which you do not concede, that the Executive should consider in the performance of this trust, in selling these patents, not only whether he was getting the most for them but the general welfare of the country, that is a subject I do not quite understand. These documents raise clearly the question of review of the Executive discretion."

This issue of the power of the court was raised by Isidore Kresel, counsel for the Foundation, on Tuesday, when the Government placed former Under Secretary of State Frank L. Polk on the stand.

Mr. Polk had hardly begun to testify when Mr. Kresel objected on the ground that courts had no jurisdiction over the exercise of war powers by President Wilson or by Mr. Polk as his representative. Mr. Anderson withdrew the witness.

"The defense argues that the courts have no power to review the executive discretion," said the Court. "We have now met on the issue for the first time. If you withdraw from that position when it is forcefully challenged, I do not undertake to say what the psychological effect may be as well as the legal effect."

When Mr. Kresel agreed that the Court should hear all the facts Mr. Polk again was placed on the stand.

During a controversy between counsel on legal procedure, Judge Morris said:

"It seems to me the direct examination and cross-examination demonstrates most clearly and forcefully the iniquity of a court of justice going into matters affecting and appealing to the discretion of the Executive or his designated agent. I had a clearly open mind on that question when the cross-examination began. It seems to me there could not be a better demonstration of the iniquity of that procedure than that which has taken place this morning, because if we go beyond the question of power, then we get into the question of international relations and the reasons moving the Executive in designating representatives in such matters, matters with which this court and, as far as I know, no other court has any concern.

"I am almost convinced at this stage of the case that the courts have no power to go behind the reasons stated in the order."

Col. Henry W. Anderson, Assistant Attorney General, held that the courts could review the administrative acts of the President.

POLK KNEW FACTS

Mr. Polk proved to be a somewhat damaging witness so far as the Government's case was concerned. He was

accused by Col. Anderson of signing the order authorizing the sale purely as a matter of routine, without being aware of the full significance of his action. This allegation he succeeded in shattering most effectually. In response to questions by Mr. Kresel, the witness said that in signing both orders, he was acquainted with the facts through Mr. Palmer's letter and report and through other information. He knew before the order was signed that it was proposed to sell the patents to the Chemical Foundation which was to hold them as trustee and make them available to the chemical industry. He was aware that the voting stock of the foundation was to be placed in a voting trust and that he knew personally three of the trustees, Messrs. Dodge, Bannard, and Ingraham.

"I was very much influenced by the fact of the positions in the Foundation held by these men," said the witness.

He knew in advance that the Foundation was to issue only non-exclusive licenses and that these were to be given to any Americans on equal and reasonable terms. He was aware that the Foundation was to grant to the United States free licenses covering all the patents and he recalled particularly that this condition related to the army and navy.

Far from having gone blindly into the sale, Mr. Polk swore he was informed of the capitalization of the Foundation, knew that its stock dividends were limited to 6 per cent and that the surplus profits above that figure were to be expended in the advancement of the chemical industry and science in this country. He knew that Garvan was to be the first president and said that it was his belief that all this was being done that the industry might be Americanized. That the cash price was to be $250,000 (the Government estimates the value of the patents at $100,000,000) was also known to the witness.

Reasons for Private Sale

Mr. Polk testified that Palmer has stressed the fact that the patents had not been used in this country and, in many instances, it was not known how they were to be used. This was brought out by Mr. Kresel to support the contention of the defense that for these reasons the patents were not worth more than was paid for them. As to the reason for the private sale, Mr. Polk said:

"If the patents were sold to individuals, the individuals would take the patents to the exclusion of the American market. The buyers might not use them, and we would be in the same situation as far as the German patents were concerned as we were before the war. It was clearly the intention, the basis of this whole transaction to break up the German monopoly."

Before the order was signed the plan to build up an American dye industry had been taken up by Secretary of Commerce Redfield and had been discussed with President Wilson, said Mr. Polk.

"Assuming there was a monopoly such as alleged, would you nevertheless have authorized the sale of these patents?" asked Mr. Kresel.

"I would assume that the Sherman and Clayton acts would protect the country, and in view of the statement that the patents would be licensed to all who required them, I would sign the order," replied the witness. "Here was an opportunity to build up a real chemical industry in this country. We have been at the mercy of Germany, many of whose patents here were not being worked. This was a wise time to make the American people independent of foreign control of dye patents."

No information had since developed which, had it been in his possession at the time, would have caused him to act other than favorably on the orders. He knew of no essential facts that had been withheld from him or suppressed.

Textile Alliance Cleared

Space forbids the reprinting of any further testimony of the first ten days, none of which, it is likely, will have as great a bearing on the final outcome as that already given. The Government occupied most of the time in stating its case, and it is believed that the defense will use up at least another two weeks in attempting to show the validity of the Foundation's title. One of the interesting points raised by Kresel was that if the Foundation's purchase was illegal, so likewise was the Government's seizure of the patents. During the progress of the trial the Textile Alliance was cleared of the Government's allegation of an interlocking relationship with the Foundation and the American Dyes Institute, since dissolved, and the name of the Alliance was voluntarily stricken from the bill of complaint. Another interesting point was the testimony that the Foundation had refused to grant the Government an exclusive license to operate the Haber nitrate process patents on the ground that this would create a Government monopoly, but had offered the Government free use of the patents on the same basis as any American manufacturer.

Opening Statements

The case as opened Monday, June 4, at which time Col. Anderson emphasized the fact that he did not attribute any wrong motives to the men who were responsible for the sale of the patents to the Foundation by the Alien Property Custodian. In answer to a question by Judge Morris as to whether an attempt would be made to show fraud on the part of the defendants, Col. Anderson replied, "Fraud in law, yes, sir; fraud in fact, I hope not."

The Government's position was summed in the following paragraph from Col. Anderson's statement: "I think it is pertinent to this case, as bearing upon the sale in the future, that the subsequent sale to a corporation of all of the stock which was held by the interests to which I refer, showed a combination of bidders for the purpose of creating a trust property, which is one of the elements to be considered in ascertaining the circumstances of the developments of this combination, and its leading up to

the fact of getting control of these patents, and bringing about a private sale thereof, under terms which we will contend were ridiculous in the matter of consideration, through such combination of bidders, which, of course, is one of the facts that equity will consider."

Col. Anderson stated that he had full realization of the importance of a self-contained dye industry in the United States but that there were legitimate means for the protection of American industry and the advancement of American industrial interests.

The important points brought out by Mr. Kresel in his opening statements for the defense were, as above stated, that the sale of the patents to the Foundation was made under the express direction of the President of the United States and that, if the United States should win its suit against the Foundation, it would mean a return of the patents to the Germans. He stated that behind the United States Government, nominal plaintiffs in the suit, stands the I. G., the German dye trust.

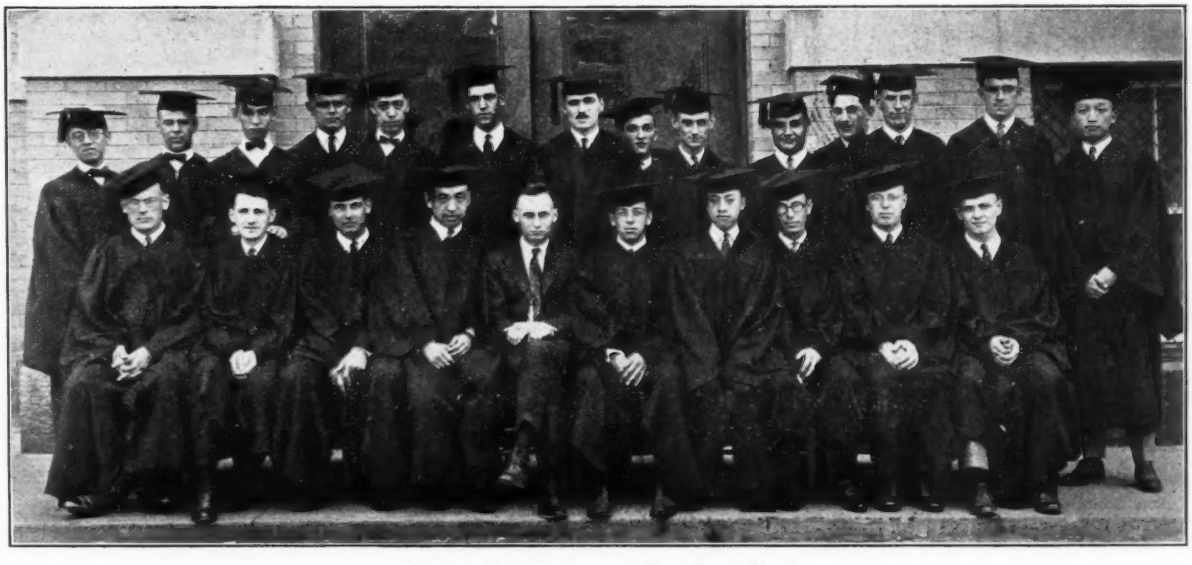
Referring to Col. Anderson's statement that there was no charge of fraud in fact, although possibly in law, Mr. Kresel stated that a reading of the bill of complaint would show that there is no charge of fraud, either in law or in fact, as against the President and other Government officers who, Mr. Kresel pointed out, directed and approved the sale.

Lowell Textile School Awards Twenty-Six Bachelor Degrees and Sixteen Diplomas

Cap and Gown Worn by Degree Men for First Time—Class of 1923 Is the Twenty-fifth—President C. H. Eames and Representative J. J. Rogers Speak

TWENTY-SIX bachelor degrees and sixteen diplomas were awarded to members of the graduating class of Lowell Textile School at the twenty-fifth annual commencement of that institution held June 5 in Southwick Hall. The occasion was made notable by the fact that the class of 1923 is the first one to adopt the cap and gown, and that most of the gowns worn by degree men at the exercises were composed of cloth made by the wearers themselves.

The principal address was given by Representative John Jacob Rogers, son of one of the original founders of the school, who told the class there was a big job ahead of textile school graduates, who, having many talents, would be held to strict accountability for the fulfillment of their proper obligations to the world as well as to the United States. He also declared that there were three classes of men, namely: those who worked with their hands, those who worked with their brains, and those who worked with both. The ability to use both powers, he explained, was prevalent in graduates from technical schools. Mr. Rogers told of his experiences in watching the progress of the school from mere infancy to its present station, and mentioned the sterling accomplishments of many of the graduates whom he had met. Telling of the progress



Class of 1923, *Lowell Textile School*

of the school, which is considered the leading textile school in this country, he said that the day had come when Lowell Textile was known all over the world, due to the graduation of a number of representatives from all the countries of the globe.

President Charles H. Eames, who delivered the address of welcome, told those present that to the first class, which graduated in 1899, were awarded six diplomas for the completion of a full course and one certificate for the completion of a partial course.

"In 1907," he continued, "the issuing of certificates was, by vote of the trustees, discontinued, and the diploma remained as the only formal paper that was awarded those who satisfactorily finished some one of the prescribed courses. In 1913 an act of the legislature authorized this institution to confer degrees of Bachelor of Textile Dyeing and Bachelor of Textile Engineering to students completing four-year courses. A few years later the degree of Bachelor of Textile Dyeing was changed by legislative act to Bachelor of Textile Chemistry, which more correctly represents the field for which the student is trained.

"During the history of the school there have been 453 graduates, of whom 53 have received certificates for partial courses, 292 have been awarded diplomas for completion of some regular three-year course, and 108 have been granted degrees upon the completion of one of the prescribed four-year courses. To-day there will be added to this number sixteen diplomas and twenty-six degrees. This represents the product of this institution during the last twenty-four years of its existence."

The year's prizes were presented by Mr. Eames and rewarded to the following:

Chemistry award—$20 to the regular student in the chemistry and textile coloring course who shall present the best thesis preparatory to graduation. Award made in books. Awarded to Chen Wang, Kinagyin, China.

Wool prize (by Edward A. Bigelow, class of '06, treasurer Hopeville Manufacturing Company, Worcester)—$75 to the student pursuing the wool manufacturing course who maintains the highest average standing throughout the course. Presented to Charles Henry Kendall, Somerville, Mass.

Medal of the National Association of Cotton Manufacturers—Awarded to the student taking courses in cotton who maintains the highest average standing throughout the course. Awarded to Burnet Valentine, Mount Vernon, N. Y. (Presentation made by Russell Fisher, assistant secretary N. A. C. E. L. T. S. '14.)

Saco-Lowell Shops prize—Awarded by William H. Goldsmith, Jr., chief engineer at Saco-Lowell. This is the first year for the prize, but the theses were of such high order that it will be continued next year. Awarded to the student or students presenting the best engineering thesis preparatory to graduation. Awarded to Naush C. Hsu, China; Tung-Chuen Wung, China. Honorable mention—Claude C. Farwell, Groton; Leon A. Davieau, Marlboro; Harold Downes Forsyth, Swampscott; Ray Baldwin Farwell, Groton.

Among the chief guests at the commencement were Mr. Rogers, who is Congressman from the Fifth Congressional District of Massachusetts; the Mayor of Lowell, John J. Donovan; H. C. Meserve, secretary of the National Association of Cotton Manufacturers, and F. A. Flather, treasurer of the Boott Mills of Lowell, Mass. Of the faculty members present in addition to Charles H. Eames, president of the school, were H. J. Ball, engineering department; Louis A. Olney, chemistry and dyeing; Edgar H. Barker, wool; Stephen E. Smith, cotton; Arthur A. Stewart, wool and worsted; Herman H. Bachmann, textile design; Lester H. Cushing, language department.

SILK ASSN. REQUESTS NEW MARKINGS BY RAW SILK IMPORTERS

Two cables, sent to the Orient recently by the Silk Association of America as the result of resolutions passed at the meeting of its board of managers on Wednesday, recommend changes in the marking of raw silk for export which, it is said, would be of great benefit to the trade there and in this country. One message, sent to the Raw Silk Association of Japan, reads: "Whereas, general complaint has been registered by the Association of Silk Merchants of Lyons, the Association of Swiss Importers of Asiatic Raw Silks and the Silk Association of America regarding the present unsatisfactory quality of Japanese raw silk, it is hereby Resolved, That the Silk Association of America, through the Raw Silk Association of Japan, request all Japanese reelers to take immediate steps to insert in each skein of silk at the time of making the skein, a small ticket, either printed in soluble ink or preferably water-marked, with the original chop and the nature of cocoons used, either spring or autumn."

The second cable, sent to the Foreign Silk Association of Canton, China, says: "Whereas, since the introduction of rereeled Canton silk there has been apparent a marked deterioration in quality, and Whereas, it is evident that unless immediate steps are taken to improve conditions the consumption of Canton silk in America will be tremendously curtailed, it is hereby Resolved, That the Silk Association of America, through the Foreign Silk Association of Canton, requests all reelers of Canton silk to insert in each skein a small chop ticket with the name of the chop either printed in soluble ink or preferably water-marked; and be it further Resolved, That the Foreign Silk Association of Canton be requested to have printed each season for use in the American market a classification list of Canton rereels, which classification can be changed from season to season as the qualities of the individual chops improve or deteriorate."

Bleaching Wool and Half-Silk Goods

Goods Must Be Grease-Free Before Stoving—The Wet Process—Addition of Indigo—Use of Sodium Peroxide—Bleaching Silk or Half Wool and Silk—Bleaching Half Silk—Soft Water—Treat Goods at Full Width—The Permanganate Process—Necessary Precautions

By J. C. C., Jr.

THE old style of bleaching by means of the sulphur stove is still extant in some places, though generally this method is giving way to more modern methods.

We remember the old style of stove for fine woolen goods was fitted with glass hooks, to which the cloth was hung by the selvedges or lists, while those of the present day which are in general use consist of a continuous passage of the cloth over suitable rollers and chains in a sulphur chamber built something on the order of a cotton aging machine. However, whatever style of chamber is used, the fumes of burning sulphur were the agent used for bleaching, and much care is essential that a certain amount of air is admitted with the fumes. In regulating the air supply it is safer to have too large a current than one too small, as sulphur will pass over unchanged if the supply of oxygen is insufficient.

Theoretically, it requires only enough oxygen to oxidize the sulphur into the dioxide, but it is better to err on the right side and have too much oxygen than too little.

Bad work may easily result from the supply of air to the sulphur being insufficient to convert it all into sulphurous acid gas (dioxide), and the sulphur itself may volatilize and condense on the fabric unchanged. This sublimation of the sulphur itself may lead to much trouble.

Goods Must Be Grease-Free Before Storing

Before stoving, the goods must be perfectly free from soap or grease, and should be just sufficiently damp to absorb the sulphur gas (dioxide) without allowing any drops to form. Sulphur dioxide is a powerful reducing agent; that is to say that it removes oxygen from the coloring matter of the wool, which *temporarily* decolorizes them and brings them into what is known as the leuco, or colorless, state.

Sulphur whites are all more or less unsatisfactory; there are two reasons for this: In the first place, the presence and smell of sulphur fumes are extremely difficult to eradicate and the goods are harsher and rougher to the hand than unstored material; while the second reason is, the white obtained by sulphur is not permanent, owing to the action of the sulphur being merely a reducing process, and the white gradually changes back to the original hue. The reader will readily understand this if he stops to consider that the oxygen in the air is continuously acting upon the reduced coloring matter and reoxidizing them back into their original condition. This change is hastened by the joint action of moisture, sunlight and air, and constitutes the chief drawback to sulphur-bleached fabrics.

The Wet Process

An improvement upon this dioxide stoving process is what is called bleaching by the wet process. This

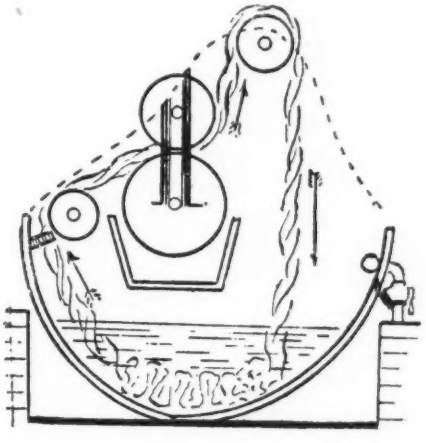


Fig. 1

process consists of running the goods through a solution of bisulphite of soda made acid by a mineral acid, or this may be modified by giving the acid bath separately after the goods have been worked in or passed through the bisulphite. In this latter case the acid liberates sulphurous acid (dioxide) within the fibers themselves, which is a far more effective method than by combining the two baths in one. This system is carried out something like this: After being scoured, the goods are passed through a solution of bisulphite of soda at 6 deg. Be., steamed without pressure for forty-five to sixty seconds, scoured in hydrochloric acid, and washed well. Bleaching in this way has, of course, precisely the same drawbacks, so far as permanence goes, as the stoving process; it, however, admits of the better clearing of the sulphurous smell, as there can be no excess of sulphur present.

In some of the newer processes, however, the yellow natural color of the wool is *permanently* removed by means of hydrosulphurous acid ($H_2S_2O_4$). This causes, in many cases, the coloring matters of the wool to be transformed into colorless bodies, which do not revert to their original condition on exposure to the air.

A similar result is produced when very yellow wool is treated with a solution of sodium hydrosulphite

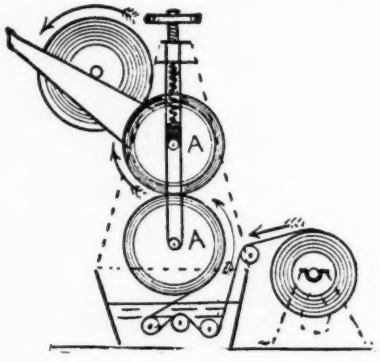


FIG. 2

($NaHSO_2$), followed by the addition of thin milk of lime until the reaction becomes slightly alkaline. When the bleaching is finished, the wool is rinsed with cold water, then treated with very dilute acetic acid, and finally washed again.

ADDITION OF INDIGO

If the goods are required to be finished into a blued white, a little indigo may be added to this hydrosulphite vat; the indigo is converted into indigo white and is absorbed by the fibers in this condition, the blue color being regained on exposure to the air. In this way the natural yellow tint of the wool is permanently removed.

All of these methods, however, are much inferior to the results which can be obtained by the use of peroxide of hydrogen. This has an effect on the goods exactly the reverse of that of sulphur, inasmuch as the coloring matters of the wool are oxidized instead of being reduced, and are then, of course, much more permanently decolorized or bleached. Hydrogen peroxide when first used was sent into the market in the form of a weak aqueous solution, and in making up the bleaching bath alkali was added to assist the decomposition. Now that sodium peroxide is a commercial article, it has quite superseded the other, as it is much more concentrated and easier to handle. Sodium peroxide is a pale yellow powder which requires to be kept dry and rightly sealed up, otherwise it very quickly decomposes. When dissolved in ice water, sodium peroxide is converted into caustic soda, heat being generated and hydrogen peroxide formed, the chemical reaction occurring under these conditions being expressed by the equation:

$$Na_2O + 2H_2O = 2NaOH + H_2O_2$$

The disengagement of oxygen by the hydrogen peroxide under the influence of heat proceeds in accordance with the equation:

$$H_2O_2 = H_2O + O$$

That is to say, the hydrogen peroxide formed is split up into water and oxygen. This shows the absolute necessity of adding the sodium peroxide very gradually, with constant stirring, to *cold acidulated* water when making the peroxide of sodium solution. This is to prevent the generation of heat which would occur if the peroxide were added in larger quantities at a time.

At a sufficiently low temperature sodium peroxide dissolves in water containing acids, hydrogen peroxide and the corresponding sodium salts being formed.

Sodium peroxide liberates 20 per cent of oxygen, while hydrogen peroxide (12 per cent by volume) furnished 1½ per cent of oxygen. Kassner has shown that the liberated oxygen also contains ozone.

USE OF SODIUM PEROXIDE

To use sodium peroxide for bleaching, for 100 to 150 pounds the following proportions are taken: To 100 gallons of water add 8 pounds of sulphuric acid, together with 3 pounds of phosphate of ammonia; 7¾ pounds of peroxide of sodium are then put in very carefully, little by little, until the bath is neutral or slightly alkaline. If intended to be worked at once it must be made slightly alkaline by the addition of a little ammonia or borax. To keep the bath without decomposition it is only necessary to put in just sufficient sulphuric acid to give an acid reaction, and when required for use the addition of a little ammonia just to turn it back to the alkaline state is all that is required.

The temperature is now raised to about 125 to 140 deg. Fahr. and the goods passed slowly through it while the temperature is gradually raised to 180 deg. Fahr.; they are then washed, and soured and washed again if necessary, or they can be dried direct from the peroxide bath on to the tentering machine without washing, provided the bath is neutral or only slightly alkaline with ammonia. In this latter case the bleaching would be going on while drying, but it would most likely lead to corrosion of the pins on the machine and mark the cloth. The bleaching might also be done on an ordinary woolen washing machine, like that shown in section in *Fig.* 1, the solution of sodium peroxide and water being added just as you would soap liquor

(*Continued on page* 469.)

Proceedings of the American Association of Textile Chemists and Colorists

The American Association of Textile Chemists and Colorists

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MAY MEETING, NEW YORK SECTION

The regular May meeting of the New York Section of the American Association of Textile Chemists and Colorists, which was the final meeting for the season, was held at the Newark Athletic Club, Newark, N. J., Friday evening, May 25.

An excellent dinner was served in a private dining room at 7 o'clock and was attended by over forty members. Several others came in after dinner to attend the meeting proper.

At the conclusion of the dinner the Chairman called upon Stewart F. Carter, the speaker of the evening, who talked extemporaneously and most interestingly on "The Old Mandarin (or Nitric Acid) Style on Silk and Other Matters of Interest in Textile Printing." A digest of Mr. Carter's talk appears directly following the report of this meeting. At the close of Mr. Carter's remarks the members tendered him a rising vote of thanks for his most interesting discourse.

The Chairman then called upon the Nominating Committee, which had been appointed at the last meeting, consisting of W. E. Mitchell, Chairman; Joseph S. Lange; Daniel P. Knowland, and Henry F. Herrmann, to make its report.

The Committee reported that it placed in nomination for officers to serve during the 1923-24 season, the following members:

For Chairman—Dr. Oscar R. Flynn, J. F. Warner, Dr. E. H. Killheffer.

For Secretary—Charles H. Jones, Herbert Grandage.

For Treasurer—Giles Low, Harrison F. Wilmot.

Mr. Low withdrew his name from the nominations for Treasurer because of reasons which he had explained to the Nominating Committee. There remaining but one nominee for this office, the Secretary was instructed to cast a unanimous ballot for Harrison F. Wilmot, who was declared duly elected to succeed himself.

The balloting for the office of Chairman was then held and the result showed Dr. E. H. Killheffer to have been elected, he receiving a majority of the votes cast.

The balloting for Secretary resulted in the election of Herbert Grandage by a substantial plurality.

The retiring Chairman, Mr. Wood, then appointed Messrs. Flynn and Warner to conduct the new Chairman, Dr. Killheffer, to the chair. Dr. Killheffer made a few remarks thanking the members for the honor conferred upon him and expressing the hope that he might be able to fill adequately the office so ably conducted by Mr. Wood during the past year. He suggested that a rising vote of thanks to Mr. Wood for his extremely able conduct with this Section be extended. This was accordingly done. In acknowledging the vote of thanks Mr. Wood expressed appreciation for the loyal support which had been extended him and bespoke the same for his successor.

A discussion of the possibility of holding a summer outing was introduced by the new Chairman. After considerable deliberation and numerous test votes it was shown to be the sentiment of the meeting that an outing

should be held, that the Green Brook Country Club, North Caldwell, N. J., was a suitable site and that some week-day during the first two weeks in July was the most acceptable time to hold it.

There was so much diversity of opinion as to the most suitable day that a Committee was appointed, consisting of Messrs. Grandage, Lange and Howes, to canvass the members and determine which of the following three days was most agreeable to the entire membership: Friday, July 6; Wednesday, July 11, and Friday, July 13.

There being no further business the meeting adjourned at 10.30 p. m.

L. C. Lewis, Secretary.

MANDARIN OR NITRIC ACID STYLES ON SILK

A digest of an extempore talk given by Stewart F. Carter at the May meeting of the New York Section.

The style referred to above originated in France more than eighty years ago, but the earliest working details in possession of the writer deal with the process as employed some seventy years ago in that country. It is based on the well-known effect of nitric acid on animal fibers as commonly illustrated when this acid gets on the fingers and imparts to them the yellow stain so familiar to laboratory workers.

Silk passed through nitric acid of moderate dilution becomes a yellow shade, which, on washing and passing into a very weak alkaline, or soapy, solution, becomes a golden orange. The writer had occasion to investigate this process many years ago, and in the preliminary trials it was found that some old acid of the commercial grade, which had long been exposed to light, gave very good results; whereas pure nitric acid at the same strength did not give the colors desired. It being therefore assumed that the old nitric acid was not pure—that is, contained lower nitrogen oxides—a small quantity of sodium nitrite was added to the pure nitric acid with very satisfactory results, proving that the assumption was correct. (Samples were shown illustrating results obtained with pure nitric acid 31 deg. Tw. both with and without the addition of 1 per cent sodium nitrite.)

The process for obtaining a white reserved object on a gold orange ground is still practised in Great Britain, to a limited extent, on silk brocades and handkerchiefs for Burmah, in which market these have long been staple goods, enjoying such popularity that imitation blotch prints with an acid orange have never received the same appreciation as the old-time work.

The old process, which remains practically the same at the present time, was worked as follows:

The well-boiled-off silk cloth was blocked with a resist composed of rosin and tallow, 2½ or 3½ parts of rosin to 1 part of tallow being melted together, a very uniform product resulting. Suitable arrangements were made for keeping the resist and the printer's sieve (on which the resist was teared) warm, while the blocks were likewise kept warm. After the melted resist was blocked on the goods, fuller's earth was dusted on the printed objects and the goods hung for a few hours to allow the resist to set and harden.

The next step was the passing of the goods through the nitric acid bath, this being technically known as "Mandrinage." The acid was used at from 35 to 45 deg. Tw., according to the class of goods and other circumstances. The temperature of the bath was from 86 to 95 deg. Fahr., not higher, and the silk was exposed to the action of the nitric acid for not more than one minute. (It will be borne in mind that the acid used contained the lower nitrogen oxides, as previously stated.)

On leaving the acid bath the pieces were passed at once into cold water and were well washed to free them from acid, chalk often being added to the first wash water. The goods were then soaped hot, the soap having an addition of sal soda, about 2 ounces per pound of soap, to remove the resist and "spring" the gold orange—that is, to turn the pale yellow color which the silk receives from the nitric acid when washed, into the handsome gold orange of the final product. All places where the resist was blocked on, being protected from the action of the nitric acid, remained white when the resist was removed by soaping. Contrary to what would generally be expected, the rosin-tallow resist dissolves off and comes away very readily in the soaping.

After soaping, the goods were washed, dried and finished. In some of the modern work a black is finally blocked on the gold and white. (One of the samples shown illustrated this effect.)

Even in the old days the Mandarin style was extended beyond the simple gold and white, and a blue object on a gold ground was often printed. The process was as follows:

The silk was dyed a medium Indigo blue, then washed and dried, and the same resist as used for gold and white was blocked on as before. On passing the goods through the nitric acid bath the Indigo blue was destroyed except where protected by the resist, and the silk acquired the yellow of the first process. Washing in water, soaping to remove the resist and spring the gold orange, as in the case of white and gold, completed the operations. (Samples of this style were shown by the lecturer.)

For the production of white and blue on a gold ground, the white cloth was first blocked with the

resist to reserve the white. A dyeing in Indigo followed, the goods being then washed in cold water and dried in the air. A second application of the resist to reserve the blue was followed by the acid bath, washing and soaping to spring the gold and clear the resist. (Samples.)

In cases as above, when it was desired to destroy the Indigo, as well as to act upon the silk, the strength of the nitric acid bath was generally increased a little.

(The lecturer then exhibited a sample of white, blue, and orange objects on a green ground.) The process for this style by the old-time method was:

Block resist on white goods, dye medium Indigo, wash and dry. Block resist on blue to reserve blue; pass through nitric acid bath; wash in cold water, but without soaping; dry goods. Block resist on yellow silk (Indigo being destroyed except where resist is printed); dye Indigo to give green ground; wash and soap to spring gold and remove resists.

(As an example of how modern processes may adapt themselves to such old methods, a sample was finally shown of a plain shade Mandarin (or nitric acid) orange with a white discharged object obtained by printing on a hydrosulphite formaldehyde discharge. The sample shown was stated to be, in all probability, the first instance of such a result being obtained.)

Of course, at the present day, colored sulphite discharges on this old-time orange, as well as white, could be produced if desired.

(Samples were next shown of light Indigo blues.)

These were produced by the so-called Propiolic Acid Blue, printed as covers over the mordants for the Madder style, the cover colors being made with orthonitrophenyl propiolic acid, borax, and xanthrate of soda. After aging and fixing, the goods were dyed with Alizarine, the printed mordants giving their respective colors, red, chocolate, etc., and resisting the covers of light blues which were formed in the process. The white resist objects present were obtained by a citrate of soda resist. This style was done in the early eighties.

(Another example of Alizarine dyed work was then shown.)

This is a handkerchief in which strong and weak alumina acetate were printed for red and pink, along with a Basic Green which contained, in addition to the tannic acid required for fixation, a suitable amount of lime juice. After printing and aging, the goods were steamed, fixed, dyed with Alizarine, oiled, steamed, and cleared, the Basic Green standing all these operations. The result was a red, pink, and white handkerchief with a bright green object.

In practice this process was generally found to be a difficult and uncertain style of work to do, as the green often turned into a dirty sage color even though the preliminary sample might have been perfectly good. The writer conducted an investigation to determine the cause of this trouble, and located it as taking place in the later stages of the fixation of the alumina mordants. It proved to be due to loose surface mordants, which came away with the thickening, and owing to the temperature of the fixing beck, combined with the tannic acid present in the basic colors, forming tannate of alumina, which, being itself a mordant, united with some of the Alizarine in the subsequent dyeing, and so spoiled the green.

It was found on trial that this later stage of the fixing operation, which was, in fact, more a removal of thickening, could be replaced by a very perfect cold-water washing and that under these conditions no alumina was taken up by the tannin of the basic colors, a perfectly bright green resulting, together with a good bright red and pink. After this the writer processed very large numbers of this style without any trouble.

SUMMER OUTING OF THE NORTHERN NEW ENGLAND SECTION

The first annual summer outing of the Northern New England Section will be held at the Merrimack Valley Country Club on Thursday, July 12, 1923.

Golf, for which there will be a special charge, may be started as early as desired.

Tennis may be played during the afternoon.

A baseball game between the married and the single men will be staged at 5 o'clock. A large ball, a small bat and no gloves will be used.

Dinner will be served as late as possible, probably about 7.30 p. m., for which a charge of $3 will be made to members and guests.

To reach the Country Club, take a Haverhill car from Lawrence (Southern New Hampshire Line).

The committee requests the active co-operation of every member.

For the Committee:
A. K. Johnson, Secretary.

MAY MEETING, PHILADELPHIA SECTION

The regular stated meeting of the Philadelphia Section of the American Association of Textile Chemists and Colorists was called to order in the auditorium of the Philadelphia Textile School, Broad and Pine Streets, Philadelphia, Friday, May 4, at 8.15 p. m. In the absence of the Chairman through illness, the Secretary presided.

The proposed by-laws, a copy of which had been sent

to every member, were to come up for discussion but action was further postponed on account of too few of our members in attendance, the combination of a beautiful, warm, spring evening and daylight saving being too much for the individuals concerned to resist.

After a discussion as to the advisability of an outing some time in June, the speaker, Dr. George W. Raiziss of the Dermatological Research Laboratory was introduced and delivered a lecture, illustrated with numerous slides and graphs on "Dyestuffs in Medicine," an abstract of which appears attached.

Meeting adjourned at 10.20 after giving Dr. Raiziss a vote of thanks for his efforts made in presenting this very instructive and interesting paper before our Section.

ELMER C. BERTOLET, Secretary.

DYESTUFFS IN MEDICINE

Abstract of paper delivered before the Philadelphia Section, A. A. T. C. C., by Dr. George W. Raiziss, Dermatological Laboratory, Philadelphia, on May 4, 1923.

This instructive and interesting paper shows another way in which dyes have been utilized. Just as numerous groups of dyes show a selective affinity for various fibers, they will combine with the cells of the living animal or the human body in a specific way. This specific cellular affinity is striking and presents a wide and fruitful field for scientific study.

The theories that have been advanced to explain the chemical and physical phenomena underlying the dyeing process with the fiber is undoubtedly always the same as will be found to explain the use of dyes in medicine.

Dyes have always been thought of as possible agents for the curing of disease and they were expected to be successful because of a combination with the microorganism in the body in a specific way.

Dyestuffs have already given success in this field of application and much work is being done throughout the world to find further curative application for them. In this work Paul Ehrlich was really the pioneer.

The similarity of structure of arsphenamine with an azo dye was shown as follows:

when it will be seen that the —As = As— group in this arsenical is comparable to the —N = N— group of an azo dye and also contains in a similar manner the salt forming groups of a dyestuff which gives it its affinity for the parasite in the body.

Chemistry by means of dyes and arsenicals has successfully combated such diseases as syphilis, sleeping sickness, and gonorrhea.

Some dyes will be retained by bacteria, while others will not after being washed with alcohol after staining. This has led to a classification of bacteria into Graham Positive and Graham Negative according to the above action. Graham was the discoverer and thus the method of distinguishing bacteria by this method has taken his name. Tubercular bacilla, staphylococcus, and anthrax are Graham positive, while cholera is Graham negative.

Beside the staining action it was found that Gentian Violet would prevent the growth of certain bacteria in agar-agar. Brilliant Green was effective in strengths of one to two hundred and fifty parts against the carrier of diphtheria. Methylene Blue has prolonged life of some cancer patients for from two to eight years.

The Germans have developed and kept secret a compound known as Baeyer No. 205, which is a cure for African sleeping sickness, by which they no doubt are hoping to make possible the living in what are now restricted areas so that vast tracts of land can be developed.

Acriflavine in dilution of one part in 50,000,000 will cure gonorrhea and has had a wide sale. In connection with the use of dyes in medicine, it has been found that chlorine introduced into Acridine Yellow or rosaniline increases the efficiency, while the presence of methyl groups is detrimental; pararosaniline being thus more effective than Crystal Violet, which is a methyl derivative of the former.

It has been found lately that research work is showing dyes as very useful carriers of mercury and other heavy metals like bismuth to the curing of specific diseases. In this way the mercury is not nearly as toxic and thus larger doses can be administered and quicker and more positive results obtained. In this connection mercurochrome, which is mercury dibrom fluorescein and mercury ortho nitrophenol, were mentioned as products lately developed.

It is seen that dye chemistry and pharmaceutical chemistry are progressing hand in hand in this country and the scientific use of the products of these industries is being earnestly investigated.

This paper was well illustrated by slides and graphs.

ELMER C. BERTOLET, Secretary.

OUTING OF THE NEW YORK SECTION

The New York Section will hold an outing on Wednesday, July 11, at the Green Brook Country Club, North Caldwell, N. J. The program will include golf and tennis tournaments, lunch and dinner. Members from other Sections are cordially invited to attend. Communications should be addressed to Herbert Grandage, 121 Willard Avenue, Bloomfield, N. J.

AMERICAN
DYESTUFF REPORTER

Devoted to the use and application of dyestuffs and the mechanical equipment incidental thereto.

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FACING IT OUT

HAVING been "let in" for it as the result of a political attack, those representing the legal branch of the United States Government are now apparently "facing it out" with the intention of putting up the best case possible, getting a decision, and closing the incident. At least, one may be permitted to assume that this to a certain extent pictures their present mental state after the sorry showing of the first trial days of the Government's suit to recover the 4,800 seized German patents from the Chemical Foundation.

The bulk of the time was used by the Government to show that the original sale was illegal and that the patents were worth many times the $250,000 paid for them. And while it is impossible to take into account the multitude of legal technicalities which may bear upon the final decision of the court, it would appear to the average layman at this writing that practically nothing in the way of a case has been established.

The motives which prompted the transaction between the Foundation and the Alien Property Custodian, together with the original purposes and subsequent conduct of the Foundation, are too well known to need further explanation here. And indeed, they are not being called into question by the Government's counsel, who disposed of that notion in a statement on the opening day of the trial. The main point at issue is whether it was legal for the Government's representatives to sell the patents after their seizure, and bringing this issue to trial has somewhat unexpectedly raised another point which bids fair to prove far-reaching indeed, and which could conceivably result in dismissal of the suit.

Federal Judge Morris, who is hearing the case, has pointed out that in order to decide whether the sale was legal or not it is necessary for him to appraise the legality of President Wilson's war-time actions and powers, as well as his powers to delegate authority to others in the event of his absence or preoccupation with more pressing affairs. And this the jurist doubts the power of his own court, or any other court, to do. He has already gone on record as being of the opinion that to do so, even if empowered, might establish a precedent which would prove embarrassing to future chief executives in the event of war. And if he decides that he is empowered to review the war-time acts of Mr. Wilson, or obtains such a ruling from a higher tribunal—which might delay further action indefinitely—such a decision would undoubtedly have a far-reaching effect on other suits now past, pending, or contemplated.

What the outcome will be, no one can with safety predict, but taking the factors above into consideration with the attitude of the court and the lack of substantiating evidence from Government counsel, the prospect of losing the German patents either to the Government or to Germans need not be regarded as too alarming.

As to the moral rectitude of such an institution as the Chemical Foundation, and as to whether the best interests of the entire country are not served by its existence, only a very few pretend to doubt that it was a happy solution of a vexing problem, and as such, ought to be preserved even at the expense of one or two picayune technicalities.

ONE SURE WAY TO ELIMINATE GRAFT IN THE MILLS

WE are in receipt of the following letter, which, because it is certain to interest a large number of readers, we here print:

THE BROOK WOOLEN COMPANY OF SIMCOE, LTD.

Simcoe, Ont., Canada, June 8, 1923.

AMERICAN DYESTUFF REPORTER,
New York City.

Gentlemen:

As a reader of The REPORTER and a stanch supporter of its policies, and as one who recognizes the capable manner in which your editorial department handles both technical matter and industrial subjects, I beg to offer a suggestion for your editorial consideration which seems to me most opportune and which, in my opinion, is of vital importance to the textile industry. I refer to the ever growing importance of color and finish in their relation to the ultimate market value of fabrics from the standpoints of both the textile manufacturer and the consumer.

After having been associated with some of the better class mills in the United States and Canada during recent years, the writer's experience leads him to believe that the following statement is amply justified:

With all due respect to the designing, carding, spinning and weaving of textiles, these factors are not worth a Continental without proper color harmonies and proper finishes. In other words, in the

opinion of the writer, too little attention is given to color and its application by a great number of our mills, for it is undoubtedly the color and finish that sell the fabrics.

Up to the point of the dyehouse and the finishing department the operations in the manufacture of woolens and worsteds may be largely classed as mechanical. The very personal element enters when the material goes to the dyer and finisher. A closer relationship between the heads of these two departments and the mill management is, in the writer's opinion, not only desirable but vital.

Yours very truly,

(Signed) G. E. TEMPLETON,
Manager.

The fact that Mr. Templeton graduated to his managership from the position of dyer with his present concern has provided him with a personal experience peculiarly well adapted to the observation of this phase of the industry, and the point which he makes above will be generally recognized as extremely well taken.

Among people to whom the textile industry is almost a family affair, and sons succeed fathers as executive heads of the mills as a matter of course, all the efforts at textile education and special training are concentrated on the first half of the production of goods—the mechanical operations leading up to the dyeing and finishing; whereas when it comes to education in the latter half of the production, these are too often dismissed with only a superficial smattering of theory and general information. Granted at the start that the first half mentioned is truly essential, this does not make the second half any the less so if the student is to realize his fullest capabilities as an executive, and failure to recognize this fact has been the cause of more than one young hopeful attempting to meet the competition of to-day with no more mental equipment than was deemed adequate for that of his father's early experiences.

It is fairly evident why a thorough knowledge of dyeing and finishing practices is necessary, even though the student does not intend to engage in them himself. It has often been pointed out that even though a woman is fortunate enough to command the services of several in help, yet lacking a fairly practical, first-hand knowledge of cookery and general housekeeping she can be imposed upon at every turn by her secretly snickering and disdainful underlings; and this provides a very homely illustration of what can, and often does, take place in the mill. If a dyer tells his chief that so and so's product positively will not do for a certain style, the latter, unless he happens to have a thorough knowledge of dyeing himself, and has kept constantly in close touch with the dyeing department, must perforce accept this dictum even though he may suspect it to be false. What can he say or do? He realizes full well that unless he can prove his point, and unless his dyer also knows he can, an attempt to compel the use of any product save the one selected by the dyer will very likely result in many yards of goods being spoiled. And if his dyer is really a capable one, and is regularly producing the results expected, it would not pay the mill executive to jeopardize the quality of his output by open antagonism or a change of dyers.

It is situations like this which make graft easy for the dyer, and by the same token it points the way for the eventual elimination of graft—which is something the textile industry as a whole would be all the better for accomplishing, but which it never yet has succeeded in beginning to accomplish.

To take a concrete example, the first which comes to hand, what dyer would attempt to "put anything over" on the writer of the above letter? Even though he might consider ways and means that showed promise, the chances are that when he remembered Mr. Templeton's years of practical and successful dyeing experience he would conclude that there were too many hazards involved and abandon the attempt. This principle is well known and made use of in all other businesses, and there is no reason why it should not just as well be considered a factor of the textile business.

Let us, then, take due cognizance of the fact that although it could not be accomplished for a matter of several years, an absolutely sure way to bring about the ultimate elimination of the grafting dyer is by creating a class of executives fully capable of going into the dyehouse and demanding to be "shown," and of the further important fact that the way to do this is by insisting that as much prominence and thoroughness be given the dyeing end of a technical textile education as is to-day accorded the operations leading up to the production of the cloth itself.

For the great bulk of textiles are not "manufactured" until they are dyed and finished, and after they are manufactured they mean nothing in the world but time and money wasted until they are sold. "The color and the finish sell the fabrics," and hence any system of training which neglects these two essentials, even though entirely adequate as to spinning, weaving and the host of operations leading up to these two, must to-day be considered incomplete.

CASH-IN-ADVANCE TALK

We wish every subscriber thought enough of this paper to pay his or her subscription strictly in advance. Many of them do, but some do not. We think a great deal of our subscribers. There is nothing within the bounds of reason we would not do for them. But some thoughtless souls overlook some facts concerning this paper which we now bring to their attention.

Subscriptions do not sustain this paper. It takes lots of advertising to make up the deficit between the cost of running this paper, and the subscription revenue.

It costs money, time and effort to secure subscribers

and keep them renewed. That cost must be passed on to subscribers and advertisers. These losses in the business must be absorbed by the profits, if there are any.

Certain credit arrangements are essentially necessary in any business. We have been pleased to extend a reasonable credit on subscriptions to subscribers who needed credit. But we cannot believe that all who accept credit really need it. Certainly credit should not be considered for an indefinite period.

Our subscription list is a permanent asset of this paper. Many subscribers have been listed for years and years. They are like old friends to a publisher. If we had to go out and renew every subscriber, our subscription costs would be prohibitive. We are striving to furnish a high-class publication at lowest cost. Your cooperation in the matter of subscription payments is earnestly requested.

BLEACHING WOOL AND HALF-SILK GOODS

(*Concluded from page* 462.)

and the goods run exactly like a scouring process; or if it is desirable to keep the cloth at full width, an ordinary padder like *Fig.* 3 can be used.

No matter what form of machine is used, there must be no screws or bolt heads left bare. All these should be sunk and covered with putty or some protection against the peroxide, otherwise stains will occur.

All goods bleached by use of sulphur dioxide show traces more or less of sulphurous acid; this sticks in spite of both washing and dyeing, and if the goods are to be dyed some light shade after stoving it may seriously interfere with the color. After bleaching with a bath of a sulphite or after stoving with sulphur dioxide, a subsequent passage through a liquor containing a little sodium peroxide or hypochlorite will effectually remove all traces and smell of sulphur. The sulphurous acid will be oxidized to sulphuric, which can then very easily be washed out in clean water.

With the exception of cream whites, it is usual to pad the goods through a weak solution of an aniline violet or blue, so as to correct any yellow tone and produce a more brilliant white. The padding machine used for this purpose is shown in *Fig.* 2 and will be easily understood by the diagram.

The squeezing rollers (AA) are covered with several yards of cotton lapping, or they may be of rubber, so as to cause a thorough penetration of the liquor, while the padded cloth, after passing through, is rolled automatically by its own weight at the back of the machine.

Bleaching Silk or Half Wool and Silk

The ordinary bleaching agent for silk is sulphur dioxide and the goods are stoved, though use is also made of sodium bisulphite, potassium permanganate, hydrogen peroxide, sodium peroxide and barium peroxide. In spite of its high price, hydrogen peroxide plays an important part in the bleaching of silk, being preferable to any other bleaching agent because it does not corrode this or any other animal fiber. In comparison with gaseous sulphur dioxide, it presents the additional advantage of giving a permanent bleach.

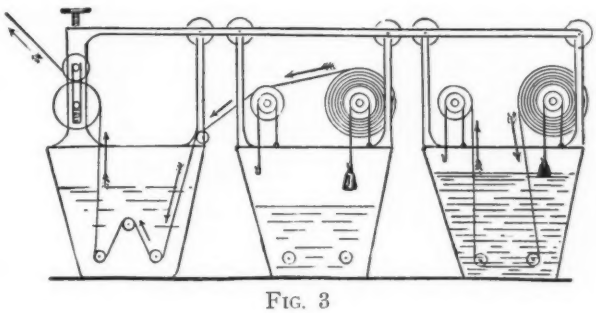

Fig. 3

Mention may be made of a new process for bleaching silk, in which the hitherto indispensable preliminary operation of scouring the silk is rendered superfluous by adding glycerine (or alcohol, aldehyde or ketone) to the bleaching solution of hydrogen peroxide. It is also worthy of note that the old practice of bluing the animal fibers (wool and silk) after bleaching is now effected before that operation.

Sodium peroxide and barium peroxide are chiefly used for bleaching tussah silk.

Sodium peroxide is well adapted for bleaching mixed fabrics (half wool and half silk) or cotton and silk mixture, a very pure and permanent white being obtained, quite in contrast to the merely temporary bleach obtained by stoving with sulphur dioxide, especially on wool.

Silk and wool mixtures may be bleached by first scouring with a little soap and soda in the usual manner, followed by scouring in a light sour and washing. They are then run through a 3 per cent bath of a solution of ammonium carbonate and then immersed in the bleaching bath.

The bleaching bath is made by diluting the 3.2 per cent solution of hydrogen peroxide with four times its volume of pure water, a suitable quantity of magnesia being added. After twenty-four hours the goods are taken out of the bath, and when washed and dried will be found sufficiently bleached but to have lost much of their luster and to have acquired a rather rough texture; the fiber, however, is not weakened.

A much better way, however, is to treat the silk or silk and wool mixture with a hydrogen peroxide solution diluted with 4 to 6 volumes of water and a little ammonia, and then put through an after-treatment with sodium bisulphate (15 deg. Be.) containing a little hydrochloric acid. This gives a fully bleached product that will retain its luster and smoothness.

A similar result is obtained by entering the silk, after twelve hours' immersion in the bisulphite liquor,

in a bath of very dilute hydrochloric acid, followed by washing and drying. The results of a number of experiments show that strong bleaching baths are required for bleaching silk with hydrogen peroxide.

Bleaching Half Silk (Cotton and Silk)

In recent years materials composed of cotton and silk have been more and more largely in vogue, and as the demand continues to increase the bleaching and dyeing of these goods assumes greater and greater importance.

The first preparatory process the goods have to go through, supposing the goods to be, say, cotton with a silk stripe, is singeing, the object being to remove the loose, fluffy fibers which are roughed up in the weaving. For half silk it is not safe to use a plate singeing machine, and so these goods should be gassed. In this process many precautions are necessary; in the first place, silk is much more inflammable than either wool or cotton, and extra care must be taken to prevent it taking fire. Most gas singeing machines are, however, fitted with a steaming box, through which the goods are drawn and all sparks, etc., extinguished. While this is done more especially in the case of cotton and cotton and wool mixture goods, it is hardly advisable in the case of goods containing silk, as experience has shown us that there is a great liability of them being stained. The best and safest method is to run the goods onto a roll, taking care to prevent any creases or unevenness from running in. To obtain even results in bleaching and dyeing it is essential that the singeing be uniform, and for this reason the first thing is to get the machine running smoothly and steadily with the gas flames lower than is usual when singeing wool or cotton goods. Silk is readily creased, and it is important to avoid these creases, as they are particularly liable to become scorched.

In order to remove the size and natural gum from the silk and the grease and size from the cotton, the goods are, after singeing, boiled off in a soap solution.

Soft Water

Soft water is of the utmost importance in this process, as it is here that the "lime spots," which have so long troubled all who work with silk, are generally formed. If possible, condensed water should be used; if this cannot be obtained, and other water has to be used, it is absolutely essential that this latter be entirely freed from lime before adding the soap. There are many ways of getting rid of the lime; some recommend an addition of monopole oil or soap, which has the property of combining with salts of lime and magnesium; one-half to one ounce of soap to the gallon are the usual proportions. Soda carbonate may also be used; the amount will vary, of course, with the hardness of the water. When the soda has been added, the water should be allowed to stand until all the precipitated lime and magnesia have thoroughly settled. The most usual way, however, is to boil up the water with a little soap; this may be done in the vessel, when the lime and magnesia form insoluble soaps which rise to the surface in the form of a scum. This is carefully removed with a skimmer and the bath again boiled up with a little more soap—if no scum forms this time it may be known that all the lime and magnesia have been removed; but, on the other hand, if more scum forms it is skimmed off and the process repeated.

The soap is kept in stock dissolved and ready for use; olive oil soap or a good white curd soap is recommended. The former is generally used for heavy goods and goods that are to be dyed dark shades only, although there is no reason why it should not be used for all classes of goods, including those that are to be subsequently bleached, provided it is a good soap of low alkalinity.

We would say here that sodium peroxide may be added to the extent of ½ to 3 per cent to the boiling-off liquor and has a good effect, but care must be taken in the use of it.

Treat Goods at Full Width

A five-box, open soaping machine is the best for this class of work, as the goods are best treated at full width. The first box to be filled with an old boiling-off liquor or the overflow from the second box, which must be fed with fresh liquor containing about 2 to 2½ ounces of soap to the gallon; this must be fed regularly so as to keep the first box full to the overflow anyway, and it is better to have it overflow a little. The other three boxes should contain hot and cold clean water for washing the goods well. The goods may require running two or three times through this to thoroughly scour. After the first run the goods (if cotton and silk) should be run through a weak solution of diastafor at 120 deg. Fahr., or less; to strip the warp sizing from the cotton, they should lie in this for an hour or so, and then through the soaper; or they can be run through the diastafor first and allowed to lie overnight, then run direct through the soaper. There are various combinations of this character governed by local conditions, and each bleacher or dyer must experiment a little and find out the best systems to fit his own particular case.

(To be concluded.)

Joseph W. Hays is just completing the organization of a corps of consulting combustion engineers to be known as Joseph W. Hays and Associates, with headquarters in Michigan City. The organization will be prepared to render consulting service in steam plants in all parts of the country.

Italy, Seeking Additional Industrial Relations, Will Be Wary of Treaty Changes

New Technical School at Milan to Create Needed Executives—Commission Appointed to Found Institute to Encourage Foreign Investment in Italian Enterprises—Germans and Swiss Send 2,306 Tons of Dyes Out of 2,488 Total to Italy in 1922—German-Swiss Dyers Give Friends Inside Track

Genoa, May 21, 1923.
Special to The REPORTER.

SEVERAL meetings have recently been held at the Italian Chamber between the parliamentary commissions of agriculture, industry and commerce and the delegates of the commission of finance and treasury for the purpose of continuing the examination of the customs tariffs and hearing the replies of the Minister of Industry and Commerce regarding the many problems submitted to the Government by the above commissions.

Minister Rossi, expressing the wish of Premier Benito Mussolini, has stated that it is not the intention of the Government to suspend the treaties already in force, as these are believed to be best adapted to cementing more closely Italy's relations with the different nations, this being one of the chief objectives of the present government.

This minister further states that if he cannot entertain the proposals of the parliamentary commission on the settlement of the treaties at present—owing to engagements taken that cannot be overlooked—he will not fail to consider in the negotiations to be initiated for future commercial agreement all those proposals that the commission may formulate.

At one of the last meeting Deputy Donegani indicated the general condition of the chemical industry by stating that this industry possesses all the qualifications necessary to development on a large scale in Italy, and his assertions were confined by Deputy Tofani, especially as regards the synthetic dye industry.

By a new law, night work of women and children, whatever their age, is forbidden in the different works. A difference in the hours considered as night has been arranged for the summer months.

As a consequence of the decree forbidding the employment of certain coloring matters considered dangerous to public health, there was organized at Milan a technical and commercial commission charged with the study of the eventual modifications to be suggested to the Government authorities on the use of innocuous coloring matters.

Through the initiative of Luigi Ronzoni, a new limited company was formed at Milan with a capital of 300,000 lire to found a new school having a laboratory for industrial chemistry. The purpose of the school is to form a body of technical directors fully capable of coping with the diversified problems of industrial chemistry. It is hoped that men who can assume full charge of various plants will thus be made available, and the school will bear the name of Giuliana Ronzoni, the mother of the founder, and will require several millions of lire for its completion. It will be erected on ground already purchased in the quarter devoted to other institutions of culture, and will be connected with the Polytechnical School of Milan. In this school a certain number of scholars will be admitted gratuitously if they have given good results in engineering, chemistry, etc., in other schools.

An important meeting, presided over by Senator Loria, was held at Rome to discuss the foundation of an International Institute for Foreign Investments in Italy. Numerous influential notables representing the Government, industry, agriculture and finance were present, and an executive commission composed of seven members was named to begin active work. The meeting was a first step forward after the decision reached at Rome by economic experts to extend income tax exemption on all foreign investments made in Italy.

TOTAL DYESTUFF IMPORTS AND EXPORTS IN 1922

The total imports of synthetic coloring matters in 1922 reached about 2,488 tons, of which 1,550 tons were received from Germany through private commerce and 756 tons on account of war reparation from that country; 162 tons from Switzerland, and 20 tons from other countries, among which were the United States and England. Of such products, 138 tons were sulphur coloring matters, 2,088 tons were other colors in the dry state, or having less than 50 per cent of water, and 262 tons were colors with 50 per cent or more of water. During the same year Italy exported 17½ tons of sulphur colors, 144 tons of colors in the dry state, or with less than 50 per cent of water, and 7 tons of colors with 50 per cent or more of water.

DEMAND FOR COLORING MATTERS

The demand for coloring matters continued very fair during the past five weeks, and centered upon war reparation products and for coloring matters imported

through private commerce, such as Acid Blacks, Acid Blues, Acid Greens, fast cotton scarlets, Congo Red, Diamine Catechine, Methyl Violet, Brilliant Green, Acid Magenta, Direct Orange Brown, Diazo Black BH, Chloramine Yellow, Cotton Sky Blues, Chloramine Yellow and Oranges, Primulin, Direct Bordeaux, Direct Violet, Steel Grays, Tartrazine, Direct Cutch Brown, the Ponceaux, Water Blues, Acid Navy Blues, Fast Milling Reds, Alizarine, Alizarine Blues, Alizarine Yellows, the Ericas, Indigo and other vat colors, Naphthylamine Blacks, Amido Naphthol Blacks, Eosine, Phloxine, the Rhodamines, Safranine, etc. The requests were distributed over the cotton, wool, silk, jute, artificial silk, paper, leather and ink industries. The Milan market was monopolized as usual by German-Swiss and German importers, who are gradually returning to their former scale of business, being greatly assisted through Swiss directors in some of the dye works, their good knowledge of the Italian market and other considerations. English exporters and the few firms importing American products, for such reasons, could do little business in this market. On other marks, such as Genoa, Florence and Naples, matters were, however, easier.

Prices of Coal-Tar Dyes

The quotations for war reparation dyes in Table I, per ton in lire and dollars, show the changes in lira and dollar prices at the moment of writing, in comparison with the prices prevailing on April 10 (the dyes being delivered in kegs from 25 to 50 kilos).

Mordants, Assistants, Dyehouse Products

The strong demand for caustic soda of April brought in May a temporary abundance of this product to the Italian market, with accompanying slight reduction in price, but the change was, however, quite small. With some other few products the same took place, whereas with others the demand remained more or less the same as in April, and little or no change in price followed. For ammonia, chloride of ammonia, yellow prussiate of potash, yellow prussiate of soda, low stocks and stronger demand on the part of some of the consumers advanced prices a little.

Private Dyehouse Quotations

Some private quotations for dyestuffs at Genoa were as follows per kilo, showing how these competed against the war reparation products: Direct Black, 26 to 30 lire; Nigrosine Crystals, 20 to 26 Lire; Chrome Black in powder, 30 to 35 lire; Acid Black, 26 to 27 lire; Direct Black, 26 to 30 lire; Direct Green, 35 to 40 lire; Eosine, 51 to 75 lire; Orange II, 21 to 24 lire; methylene Blue, 75 to 91 lire; Liquid Fustic Extract, 7 to 7.50 lire; Logwood Extract, 6.50 to 7.50 lire; Hematine Crystals, 10 to 12 lire.

Mineral Coloring Matters

The demand for mineral coloring matters was very

(*Concluded on page* 481.)

TABLE I

	April 10		May 10	
	(lire)	(dollars)	(lire)	(dollars)
Naphthol Yellow	40,000—65,000	2,051—3,333	40,000—65,000	1,904—3,095
Auramine	60,000—70,000	3,076—3,589	60,000—70,000	2,857—3,333
Orange II	20,000—22,000	1,025—1,128	20,000—22,000	952—1,047
Nigrosine, water soluble	28,000—35,000	1,435—1,794	28,000—35,000	1,333—1,666
Nigrosine, soluble in alcohol	30,000—38,000	1,538—1,948	30,000—38,000	1,428—1,809
Sulphur Black	7,000—11,000	358— 564	7,000—11,000	333— 523
Acid Black	24,000—28,000	1,231—1,435	24,000—28,000	1,142—1,333
Direct Black	24,000—30,000	1,231—1,538	24,000—29,000	1,142—1,380
Chrome Black	28,000—34,000	1,435—1,743	28,000—32,000	1,333—1,523
Methylene Blue	75,000—90,000	3,846—4,615	75,000—90,000	3,571—4,285
Direct Blue	22,000—26,000	1,128—1,333	20,000—25,000	952—1,190
Sulphur Blue	22,000—28,000	1,128—1,435	20,000—25,000	952—1,190
Malachite Green	75,000—90,000	3,896—4,615	75,000—90,000	3,571—4,285
Acid Green	60,000—70,000	3,076—3,589	60,000—70,000	2,857—3,333
Direct Green	30,000—35,000	1,538—1,794	30,000—35,000	1,428—1,666
Bismarck Brown	30,000—35,000	1,538—1,794	30,000—35,000	1,428—1,666
Magenta (Fuchsine) Crystals	70,000—80,000	3,589—4,102	70,000—80,000	3,333—3,809
Eosine	50,000—75,000	2,564—3,846	50,000—75,000	2,380—3,571
Ponceaux	25,000—30,000	1,282—1,538	25,000—30,000	1,190—1,428
Methyl Violet	65,000—80,000	3,333—4,102	65,000—80,000	3,095—3,809

NEPS IN COTTON FABRICS AND THEIR RESISTANCE TO DYEING AND PRINTING

(*Continued from page* 456.)

employing Indigo, chrome-orange, aniline-violet fixed with tannin, or aluminum and iron mordants, where the dyes were attached to the cloth by deposition from basic solutions of their salts. By this method of fixing, with iron and alumina, white spots appeared which, so Crum believed, would not have been discernible if ordinary mordants had been employed. On examining fabric dyed with a safflower-pink, however, Crum observed that the dead cotton seemed to have attracted its full proportion of dye, and the same was the case with Prussian Blue produced from stannate of iron. By repeated dips in the Indigo vat, the dead cotton was concealed if not otherwise dyed.

Haller agrees with Crum that the occasional hairs which do not take the dyestuff are really unripe cotton, as the following summary of his observations indicates. Under the microscope, the lumen of this type of hair is seen to contain a considerable quantity of matter, and the hairs do not appear to be convoluted so much. When treated with "cuprammonium," the hairs swell up but do not go into solution. On treating a mixture of ripe and unripe hairs with a solution of iodine in zinc chloride, the unripe hairs quickly develop a blue color which appears much more slowly with the ripe hairs. A solution of iodine in potassium iodide colors the ripe hairs a dark brown, unripe hairs acquiring only a light yellow color. In 18 per cent sodium hydroxide solution, the unripe hairs retain their convolutions, and only become lighter and more transparent. On dyeing with direct dyes, the unripe hairs acquire the deeper color. Treated with tannin-antimony mordant and dyed with basic dyestuffs, unripe hairs are only dyed in the interior while ripe hairs dye homogeneously.

Herzog states that the dead hairs, which are encountered especially in cotton yarns of poor quality, acquire a considerably lower depth of color on dyeing in the fabric than fully ripe hairs. This he considers to be an optical effect which is connected with the striking difference in dispersion of the two types of hairs. The thickness of the wall of dead hairs is only 0.5 mu, and if a section of this order of thickness is cut from a thick-walled, fully ripe hair, no deeper color is apparent, showing that the depth of the color is conditioned by the thickness of the wall. If several thin pale blue glass plates are piled together to the height of 1 cm. they will appear less deeply colored than a single plate 1 cm. thick made of the same glass.

Herzog attempts to distinguish between dead and unripe hairs by their behavior in cuprammonium solutions, and by their appearance under polarized light. He states that unripe hairs have a rich protoplasmic residue in the lumen which enables them to absorb substantive dyestuffs more readily than normal hairs. Dead hairs are considered to possess no appreciable cell contents.

Examination of Faults Submitted

Certain goods from the Calico Printers' Federation, dyed alizarin style, exhibited defects consisting in the appearance of lighter motes showing up on the dyed background, and in a streaky effect due to irregular variations in the shade of the dyed background. The opinion of the calico printers who submitted the goods was that the white motes are due to "neps," i. e., clusters of short folded immature hairs which failed to absorb either the

Fig. 1—*Teased-out nep, showing matrix of primary wall debris together with a few normally-dyed hairs.*

dye or the mordant or both. They believed that the streaky effect is due to some inferior quality in the cloth receiving its maximum expression in the motes, and stated that the fault is most prevalent in goods dyed with alizarins, Para Red and Indigo.

The results of examination of the fault will be dealt with under the following headings: (*a*) The motes, (*b*) the streaks, and (*c*) the gray cloth.

The Motes.—The defects due to motes are of the following main types:

1. A nep which is only loosely incorporated in the yarn becomes detached after printing, leaving a white area below.

2. A loose end of yarn becomes detached or moved to one side after printing and exposes a white patch below.

3. Small white specks involving a large number of hairs, all of which proved to be dyed normally at other portions of their length. The specks of this type are confined to a single strand of yarn, thus eliminating roller damage as a factor in its causation. More than one type could be distinguished. In some cases the white spot was so far below the general level of the fabric that it could not have been affected by the printing roller. In other cases the mote occurred at the general level of the

fabric, and was possibly protected from the action of the dye by a particle of foreign matter.

4. Neps *in situ* causing lighter spots are by far the most common type of defect. Under a low-power binocular microscope they were seen to consist of a matted tangle of hairs, a few of which showed the rich development of color characteristic of normal hairs. When dissected, the nep was resolved into a mass of lightly dyed or undyed thin-walled hairs which, in the aggregate, however, was intensely colored. The individual hairs were separated from each other with difficulty, and sometimes crumbled to fine particles at the slightest touch of the needle.

FIG. 2—*Nep, showing tangle of thin-walled hairs*

When a whole nep was mounted in Canada balsam, a substance of refractive index similar to cotton, the general shade of color was not materially different from that exhibited by normal parts of the fabric. This suggested that much of the apparent difference in color in hand specimens is purely optical, and due, as Herzog suggested, to dispersion effects. It is worthy of note that the surface neps exhibit a high degree of glaze, imparted, no doubt, by the calendering process, and thus reflect more light than the ordinary dyed yarn. Experimental dyeing of the gray cloth with Congo Red failed to reveal any marked differences in shade, but on treatment with a hot iron in a damp condition to imitate the calendering process the neps became glazed and immediately showed up as typical light patches. In fabrics dyed with Para Red, however, the motes were prominent in uncalendered goods, and the intensifying effect of calendering is, therefore, not universal.

The Streaks.—A defect in dyeing is often shown in the presence of light streaks confined to a single strand of yarn, extending in some cases to a length of 6 mm. or more. When the cloth is held up to the light, the streaks are dark, rather than light, an dthis is also the case in specimens cleared in clove oil and mounted in balsam. Under the microscope, the same matted tangle of thin-walled, fragile hairs was seen, with a few strongly dyed normal hairs running ridgelike across the semi-glazed surface. The streaks may thus be regarded as elongated neps. When dissected, the tangled mass resolved itself into a mixture of unthickened and partially thickened hairs, together with broken tips of hairs. On the whole, the elongated neps were essentially the same in structure as the surface neps previously described.

A point of some importance, however, requires emphasis. Although most of the hairs in neps were undoubtedly weakly dyed, there were isolated patches of the debris in which color could not be seen. In spite of the difficulty of manipulation, small portions of such hairs were treated with sodium hydroxide of the usual mercerizing concentration, and measurements were made which showed that no shrinkage had taken place; it is therefore clear that associated with the tangle of thin-walled hairs was a matrix of hair debris with practically no secondary thickening. This debris exhibits dispersion effects to a high degree, particularly when glazed, but, on account of the absence of dye, becomes almost invisible in mounting media of approximately the same refractive index.

FIG. 3—*Thin-walled hairs occurring in a parallel bunch in the dyed fabric, lighter in shade, but not in the form of a nep.*

A comparatively uncommon type of streak consisted of a group of hairs which were not so thin walled as to form neps in the spinning process, but which were too thin walled to exhibit the full development of color. There was only a slight difference in color from the rest of the background.

The Gray Cloth.—A sample of the gray cloth before dyeing was examined, with the following results:

1. Tufts of thin-walled hairs, exhibiting parallelism, could be readily recognized by their semi-glassy appearance. Dyeing of these portions would result in a localized slight diminution of the full shade of color.

2. Neps consisting of thin-walled hairs in a matted and tangled condition were abundant. Most of these were yellow in color.

3. Seed coat particles were abundant, and often formed the nucleus of neps.

Tufts of thin-walled hairs similar to those described under (1) above are a common feature of normal seeds, and are to be ascribed to unfavorable conditions of nutrition during growth, a question which will receive fuller discussion later.

Yellowness of thin-walled hairs is invariably a consequence of attack by insect or cryptogamic parasites during boll development.

A large amount of thin-walled, yellow-stained cotton occurs in West Indian, Sea Island cotton through this cause, and is baled and shipped specially as stained cotton.

Effect of Mercerization on the Color of the Neps.—An Indigo-dyed fabric in which the neps were of conspicuously lighter shade than the background was compared with similarly dyed cloth which had previously been mercerized. The general result of mercerizing was to render the defect much less obvious. This fact is apparently well known to the trade, and has its explanation in the change of geometrical conformation of a mercerized hair. The flattened ribbon, characteristic of a thin-walled hair possessing an appreciable amount of secondary thickening, is converted on mercerizing into a form in which the area of cross-section tends to be circular, and in which dispersion effects are minimized. The wall thickness is considerably increased and a greater capacity for taking the dye results. The primary wall debris containing no cellulose is not affected by mercerizing and thus the defect is still visible to some extent.

Summary of Observations and Conclusions on the Fault.—1. The presence of motes and streaks of a lighter shade than the dyed background is mostly due to the presence of neps.

2. The neps consist of a matted tangle of thin-walled hairs which, in surface view, exhibit a glazed appearance.

3. The thin-walled hairs are essentially of the type described by Crum as "dead cotton."

4. Herzog's view that the difference in shade is purely an optical effect is substantiated on two main grounds: (*a*) Elimination of dispersion effects by immersion in various mounting media renders the difference in shade in dyed hairs practically negligible, and (*b*) in experimentally dyed cloth, the motes and streaks only appeared when the glazed surface of the neps was produced with a hot iron.

The Cell Wall Thickness of Cotton Hairs

Since the main cause of the differences in shade of the dyed background of the fabric has been established to be due to thin-walled hairs, i. e., to unequal distribution of wall thickness in the hairs composing the yarn, it is advisable to discuss the question of wall thickness in some detail, more particularly with references to the causes of variations in magnitude and mode of distribution of this character.

Balls[5] points out that if, for any reason, the cell wall of the hair consists mainly or entirely of primary wall with little or no secondary thickening, there will be little resistance to bending stresses. Consequently, such flabby

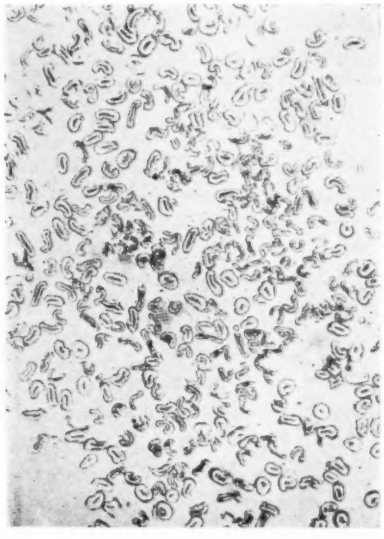

FIG. 4—*Cross sections of hairs all from approximately the same point on the seed coat, illustrating occurrence of patches of thin-walled hairs in association with normal hairs.*

hairs will be easily rolled into a tangled nep or coil. Such hairs are more likely to occur in fine cottons which have normally a thin secondary wall. Some environments produce more than others, as also do some varieties; thus West Indian, Sea Island cottons are bad in this respect, while Sakellaridis Egyptian cotton is inferior to the varieties which it has replaced, and the now extinct Yannovitch cotton was remarkably free from nep. Since one of the causes of flabby hairs is genetic, it is clear that the recognition and elimination of strains possessing an abnormal amount is one of the most promising methods of reducing nep.

Production of Neps During Manufacture.—Given the presence of hairs with thin walls, there are many opportunities during manufacture which are likely to produce neps by their differential reaction to bending stresses. Among the recognized causes of neps are the following:

In *Ginning.*—Faulty ginning.

In *Scutching.*—(*a*) Excessive beating; (*b*) beater blades out of order; (*c*) trying to get too much cotton through one machine.

In *Carding.*—(*a*) Carding too heavily; (*b*) neglecting stripping and grinding; (*c*) bad setting, rollers and clearers, doffer and doffer combs; (*d*) allowing the web to

become broken and to fill up all space between the doffer and the calender roller, until the cotton is carried over the doffer and fills up the doffer comb, so that a portion of the hairs remains subject to the action of the comb for some time; (*e*) overloading the wire.

The Botanical Aspect.—From the point of view of the botanist, there are two sets of factors influencing the cell wall thickness of cotton hairs; these are respectively environmental and genetic.

The Influence of the Environment on Cell Wall Thickness.—In the first place, it is beyond dispute that each individual cotton plant possesses a certain association of genetic or hereditary factors which, under constant environmental conditions, are capable of manifesting themselves in the production of hairs of a definite length and wall thickness. Environmental conditions, however, can never be equal in their effect on all parts of the plant. For purposes of discussion, they may be divided into two main classes, external and internal.

The external environment includes within its scope soil conditions, water supply, temperature, humidity, density of population, air movements, illumination, etc. A change in the general environmental complex will, in some way, be reflected in mean cell wall thickness, and in support of this statement may be adduced the well-known seasonal variations in the quality of the cotton crop from year to year, grown from the same seed. Thus, when seed of Superfine St. Vincent cotton was grown in a region of little rainfall the wall thickness apparently increased *pari passu* with the environmental aridity, but when grown in the humid greenhouse of the Shirley Institute, the wall thickness was reduced so that the cotton was virtually of the same magnitude as that characterizing "dead cotton."

The internal environmental effect is chiefly positional. There is competition for nutrients from boll to boll, from seed to seed in the boll, and from hair to hair upon the seed. In examining cross-sections of hair from the same seed, it is not unusual to find patches of one to two hundred hairs closely grouped together, characterized by thin cell walls. It is clear that proximity to the nutritive channels plays an important part in the determination of wall thickness. Patches such as this not infrequently pass through to the finished yarn, as was noted in the discussion on the fault described in this paper. The differences in the position of bolls on the plant would make itself felt as an influence upon wall thickness even if they were all at the same stage of maturity at the same time. This is not so, however, and in practice the later bolls on the plant usually mature at a time when, by reason of senescence or attack by cryptogamic parasites, the leaf area of the plant capable of photo-synthetic activity has been considerably reduced. Not to be forgotten, also, is the effect of reduction in photosynthetic activity due to defoliation by leaf-eating caterpillars, which in some cotton-growing districts may take place at almost any period of the growing season. It will be seen that distribution of wall thickness of hairs in a given bale is necessarily patchy. Uniform environment on the seed coat does not involve more than a limited area, and elimination of positional effect can only take place in hairs which are adjacent on the same seed.

The influence of competition from seed to seed in the same boll may, in extreme cases, result in the death of half-grown seeds, which are clothed with hairs of little or no secondary thickening. Examination of a large number of bolls both of Upland and Sea Island cottons shows this phenomenon to be of frequent occurrence, so much so that probably most of the flabby hairs in undiseased cotton is due to this cause.

The Influence of Genetic Factors on Cell Wall Thickness.—It is probable that the death of some of the partially developed seeds in the boll is due to the genetic incompatibility, i. e., the combination of male and female elements which have united to form that particular seed is non-viable after a certain age. Some varieties differ constantly in the percentage of non-viable seed, and the basis of this can only be genetic.

Death of Seed Through Attack by Insect or Cryptogamic Parasites.—It has been mentioned above that the death of seeds either through competition or for genetic reasons is a fruitful source of flabby hairs. Death of seeds may also be caused by boll-puncturing insects, chiefly types of plant bug, carrying various forms of fungoid infection. In this case, the seed may be drawn upon by the insect for its food supply and ultimately killed, or a general growth of micro-organisms may additionally supervene and involve the whole boll in decomposition and disorganization. Certain boll diseases may attack the external wall of the boll, and by progressive penetration, destroy more or less of the boll contents.

Whatever the cause of the death of a seed in a half-matured condition, the hairs on that seed are invariably excessively thin walled and weak, and are likely to initiate neps in the spinning process. The yellow color, whether due to insect puncture or disease, is strongly characteristic, and such cotton may be suspected as the source of some at least of the neps in neppy cloth.

General Considerations

It is clear from what has been said above that the existence of thin-walled or flabby hairs in a sample of cotton is due to a variety of causes, some of which are partially avoidable and others inevitable. The consumer of cotton is at present helpless in the hands of the agriculturist. His most urgent requirement is uniform cotton, and in regard to the present problem of thin-walled cotton, the position may be summed up by saying that the variability of the wall thickness should be reduced to a minimum. Those engaged in cotton breeding are urged to take up the study of means of eliminating strains characterized by thin-walled cotton, and to investigate the physiological and genetic factors conditioning its appearance. From the point of view of the spinner, the recognition of raw cottons containing abnormal amounts of thin-walled hairs is important, and a method is under

consideration whereby it is hoped to establish definite standards for wall thickness in varying types of cotton, and in conjunction with this to obtain an idea of the number of thin-walled hairs normally present.

Summary

1. The work of Crum, Haller, and Herzog is summarized.

2. The results of microscopic examination of an alizarin-dyed fabric which showed motes and streaks are presented. The conclusion is drawn that the defect is one essentially similar to that described by Crum, and is attributable to neps composed of thin-walled hairs. The difference in color of the neps is considered to be mostly optical in nature, for reasons which are given, but the nep aggregate apparently contains debris of hairs consisting of primary wall only, which are glassy in appearance and remain undyed.

3. The effect of mercerization on the difference in color shown by neps in an Indigo-dyed fabric is to render such difference less conspicuous. This is considered to be due to alteration in the shape of the cross-section, reducing dispersion effects, and to an increase in the wall thickness, which causes an increased capacity for dye.

4. The cell wall thickness of cotton hairs is considered in detail, and reference is made to the recognized causes of neps during manufacture.

5. The effect of environmental and genetic factors on cell wall thickness is shown to be complex, and it is concluded that much of the thin-walled cotton arises through death of seeds before maturity, either through competition, genetic factors, or attack by parasites.

6. Elimination by genetic methods of strains characterized by excessive amounts of thin-walled cotton is suggested to the cotton breeder, as well as a detailed study of the physiological and genetic factors influencing its amount.

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Shirley Institute, Didsbury.

The Application of Color to Leather

Difficulties Met With in This Field—Tray Dyeing—Trough Dyeing—Paddle Dyeing—Drums—Staining—Vegetable Tanned Leathers—Dyeing of Chrome Tanned Leathers—Alum Tannage—Oil Tannage—Aldehyde Leathers—Combination Tannages—Fastness Properties of Dyed Leathers

By T. E. BRADBURY

A paper read before the London Section, Society of Dyers and Colourists, and published in the Journal of the Society

When suedes are being dyed, it is also advisable to use a combination of colors that penetrate to the same extent, and the use of such mixtures as Acid Orange G (which penetrates very readily) and Acid Green G, or Light Green SF, should be avoided if possible. Perfect penetration is difficult with some tannages. The use of ammonia or ammonium carbonate with acid dyestuffs assists the penetration more than ammonium acetate, but the alkali strips more tan from the leather and the skins are left somewhat tinny and harsh.

When very heavy shades of color are required, acid dyestuffs may require a topping with basic colors in a fresh bath. In this way the weak grain is less noticeable than when employing the basic colors only.

The employment of iron salts in the production of grays sometimes leads to uneven colors, owing to the loose-grained portions of the skin retaining more tan than the other parts, with the result that more iron salt is fixed, and a deeper shade results. Gray shades may, however, be dyed without the use of iron salt, and mixtures of Naphthalene Black 12B, Cardinal Red J and Citronine, or Naphthalene Black 12B and Acid Orange G give very good results. The penetration of color may not be sufficient for suedes, but is sufficient for glazing work.

A great difference in shade may result from the process of glazing. In this operation the dyed skins, after being struck out, dried and seasoned with a mixture of milk, albumen and water, are subjected to friction glazing with a glass or hardwood roller. The greater the pressure exerted on the skins the higher the glaze and the deeper the resulting color, and in matching a pattern with skins that are to be subsequently glazed allowance must be made for this ap-

parent increase in color. If the skins have been dyed with a mixture of dyestuffs that penetrate differently, the tone of the resulting color may be altered by the glazing process, tending toward the color of the dye which penetrates most easily. Also, unless the color has been well dyed into the grain surface the glazing operation may make the skin look patchy and uneven, although before glazing it might appear level in color. A dark colored tannage usually results in a heavier shade after glazing than a skin of lighter body.

A dyer is often blamed for uneven colors which are due to causes over which he has no control. If a skin is badly shaved, and consequently uneven in thickness, the operation of glazing will cause the finished skins to appear uneven in color, due to the extra pressure in glazing exerted on the thicker portions of the leather. Any portions of the skin which are missed by the shaver have also a different affinity for dyestuff to those parts that have had a shaving taken off. In all probability this is due to partial oxidation of the tanned surface through exposure to air.

It is essential that the dyed skins should be dried as quickly as possible. The longer they are allowed to lie in a wet state the lighter in shade they become, and the color may also change considerably if the colors used have widely different solubilities. Thus browns dyed with mixtures of Orange II and Naphthalene Black 12B become duller in shade as well as lighter, and grays dyed with Naphthalene Black 12B, Cardinal Red J and Citronine become greener, the two former colors being more soluble than the yellow. For this reason the dyer passes out his shade on the bright side or the red side, as the case may be, if there is a likelihood of the skin being delayed in drying. In the wet state vegetable tanned leathers are very easily stained and should never be allowed to come into contact with skins of another color, or with metal such as iron or zinc.

Dust often contains specks of iron which will cause staining of light colors almost immediately, and this must be guarded against.

In "matching off" to a pattern the leather dyer is handicapped to a certain extent by the difficulty of quickly drying portions of skins, without adversely affecting the color. Leather which is dried quickly becomes a good deal darker than when dried slowly. This point must be borne in mind when matching with dried cuttings or sample skins. If the matching is to a glazed pattern, and the goods are to be subsequently glazed, the skins are usually dyed until in their wet state they match the glazed pattern, but where the pattern to be matched is not glazed a dyer will often wet down a portion of it and compare with the wet skins.

The use of pigments on leather is extending fairly rapidly. In the case of enamels and chamois the practice is an old one, and gives certain good results. Many manufacturers are now giving their leathers a covering of pigment paint or dope after being dyed. This may level up the shade, but the resulting leather resembles the artificial substitutes. Leather partly owes its char mto the little imperfections of grain formation and surface, and these are to a certain extent obliterated by pigmenting, and the continued use of this process will eventually result in the lowering of the high position which leather has held for so long.

Discussion

S. Verrinder asked how a blue shade could be obtained on the flesh side in dyeing black on chrome leather. Also what was the limit of sulphonated oil which could be used without affecting the nap or pile of suede leather? In the dyeing of glove leathers, which are the most suitable colors from the point of view of resistance to perspiration?

The lecturer replied that a blue shade on the flesh side in dyeing black on chrome leather is obtained by using a suitable direct black along with Nigrosine. Two per cent of sulphonated oil is the limit percentage for use on suede leather. Sulphide and mordant colors are the fastest to perspiration on glove leathers.

G. H. Shaw asked for particulars as to the dyeing of moleskins, alum cured. How can the hair side of the skin be made to take the dye as well as the flesh side?

The lecturer replied that the skins must be agitated to effect penetration.

R. B. Brown—Perhaps the use of dyes of the Ursol type would give the required result.

F. W. Lake asked what colors were the best for redyeing made-up leather articles, and what is the most approved method of stripping old grounds?

The Lecturer—To get level results it is advisable to degrease with volatile solvent. The most suitable strip would be a hydrosulphite strip, and the best results would be obtained with acid colors applied by brushing.

In reply to another question from Mr. Verrinder, the lecturer said that a seasoning of milk and water would remove bronziness in every case, even with Methyl Violet.

MORE CARE NEEDED IN PACKING HOSIERY FOR EXPORT TO CHILE

The continued pilferage of hosiery at ports in Chile, says Assistant Trade Commissioner W. E. Embry, Santiago, again makes it necessary to bring to the attention of American manufacturers the necessity of taking extreme care to protect their goods destined for that country. In order to prevent, or at least to lessen the amount of, theft following the arrival of vessels at Valparaiso, it is urged that double cases be used. One large concern in Santiago, which represents several important American manufacturers in the Chilean market, has repeatedly asked exporters to pack hosiery in double cases that have the boards of the inner case running diagonally to those of the outer case. In spite of the fact that the Chilean agent has offered to pay the additional cost of such packing, including lumber, extra labor, etc.—assured that the

saving effected would more than counterbalance the additional expense—American manufacturers have failed to comply with the request. Despite the growth of the hosiery manufacturing industry in Chile, there is still a market for this commodity which is well worth protecting and developing in every possible way.

SWISS COAL-TAR DYE EXPORTS

Switzerland's exports of coal-tar dyes in 1922 amounted to 3,872,800 kilos, valued at 55,257,000 francs (kilo equals 2.2046 pounds; Swiss franc equals 19.3 cents at par), compared with 3,706,700 kilos and 57,676,000 francs in 1921. On the other hand, a very marked increase occurred in the year's shipments of artificial Indigo, these reaching a total of 3,460,800 kilos, valued at 13,158,000 francs, against 1,182,900 kilos and 9,497,000 francs in 1921. The trend of the trade from quarter to quarter can be traced in the following table:

SWITZERLAND'S EXPORTS OF COAL-TAR DYES, 1921 AND 1922

Articles and Chief Countries of Destination	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Total for Year
Aniline and other coal-tar dyes:	Kilos	Kilos	Kilos	Kilos	Kilos
1921	802,500	992,300	751,100	1,160,800	3,706,700
1922	1,062,400	883,400	927,900	999,100	3,872,800
United States	157,000	221,300	243,000	90,000	711,300
Belgium	85,700	64,800	79,600	98,100	328,200
France	281,000	193,100	172,200	331,400	977,700
Great Britain	294,800	167,100	162,100	162,600	786,600
Artificial Indigo:					
1921	22,500	26,800	294,900	838,700	1,182,900
1922	576,900	773,100	945,100	1,165,700	3,460,800
China	541,400	701,700	830,700	1,021,000	3,094,800
Japan	27,909	56,000	50,300	30,800	165,000

The sharp drop in exports to the United States in the closing quarter of 1922 is attributed to the coming into force of the New American tariff on September 22. Swiss dye manufacturers are said to be complaining of German competition and the effect on trade of German reparation dyes.—Vice-Consul William H. Mathee, Zurich.

The Camden Woolen Company, Camden, Me., new dyehouse will be one story high, 62 by 70 feet.

The Diamond Silk Dyeing & Finishing Company, Inc., of Paterson, N. J., has been incorporated with a capital of $125,000. E. B. Randall is the incorporator.

Experiments in growing cotton in New South Wales have in most instances this season met with failure. Poor results have been caused by the dry weather and insect pests.

EASIER READING MERCURY THERMOMETERS

While no fault could be found with a well-made mercury thermometer on the grounds of accuracy, this type has met with much criticism because it was difficult to read. Mercury was necessary from the standpoint of accuracy, but nothing could be done to increase the visibility of the mercury.

A new method of tube construction, however, has overcome this shortcoming of the mercury thermometer. The feature, known as the TAG-Hespe Red Reading Column, shows a broad red line from the top of the mercury column to the top of the tube. When the mercury rises it covers more of this red line; when the mercury falls, a correspondingly greater length of the red line is visible. This red line attracts the eye at first glance and it is easy to follow it *down* and take the reading. This feature brings to the accurate mercury thermometer the easy readability of the red spirit thermometer.

The C. J. Tagliabue Manufacturing Company, of Brooklyn, N. Y., has secured the sole manufacturing and selling rights of this important improvement as applied to all types and forms of mercury thermometers for industrial purposes.

This aid to easy and precise reading of industrial thermometers is thus an exclusive TAG feature with which are combined the established accuracy, durability and exact workmanship of TAG thermometers.

The exceedingly low extra charge made for the TAG-Hespe feature is possibly only because of large-scale production by which the increased cost of the special glass has been partially absorbed through a general decrease in manufacturing cost.

The Moorhead Knitting Company, Harrisburg, Pa., has purchased the plant of the Pennsylvania Textile Company at Carlisle and may operate it later.

The Fading of Colors in Light

A QUESTION of considerable interest to manufacturers of dyes and colored textile materials—the fading of colors under the action of light—was discussed in a recent paper before the Royal Society of Arts in London by Sir Sidney Harmer, who is associated with the British Museum. The pitiless march of destructive forces is a matter for serious concern to curators of museums. Practically all colors fade in course of time, though some are more fugitive than others. As an extreme instance it was mentioned that the purple ink used in typewriting work, when exposed to strong sunlight, showed distinct fading after only two hours' exposure, and eventually disappeared entirely, leaving the paper blank! Other colors, such as magenta and carmine, showed fading after only four to ten days' exposure. Fortunately natural pigments seem able to resist better than artificial ones. Thus furs of some animals resisted action for 1,485 days, though the wings of some butterflies showed appreciable fading in a few weeks.

Some discussion took place on the question whether it is possible to get a direct relation between time of exposure and degree of fading. This was considered impracticable. Different pigment behave so differently and their chemical structure is so complex that the exact course of fading varies much. One curious circumstance mentioned was that, if Indigo is used as a water color, it behaves very badly, whereas when it becomes a dye its behavior is admirable.

The conditions giving rise to fading seem to be fairly well recognized. It has long been known that the rays from the violet and ultra-violet end of the spectrum are particularly active in this respect. This is so well recognized that the quartz-tube mercury vapor lamp, which is very rich in ultra-violet rays, has been used as a test of permanency with good effect, strong exposures causing an amount of fading in a few days that would only occur in months when materials are exposed to daylight; this artificial source is specially useful in those localities where there are periods of the year during which the sky is overcast and there is little bright sunshine available. The researches of Dr. Russell and Sir William Abney have also shown that fading does not occur if the material is kept *in vacuo, i. e.,* if oxygen and moisture are excluded, and that moderate heat has no material influence. There are certain glasses which obstruct the passage of ultra-violet rays, but experiments showed that, while some of these delay the process of fading, they do not eliminate it.

It is obviously impracticable to enclose most colored objects in a vacuum. The life of the colors can be prolonged by keeping specimens in a dry dark place. But, of course, in museums specimens would be of little value if always kept out of sight, and the same problem arises in showrooms where delicate dyed textile fabrics are on view. It has been ascertained, however, that diffused daylight is much less injurious than direct sunlight—apparently the effect is only 1/20 to 1/70 times as great. There is, therefore, something to be said for the use of light-colored blinds to diffuse the light. If these are of a yellowish tint, this helps to exclude the active ultra-violet rays but, on the other hand, tinted blinds would cause distortion of the appearance of colors. A point of great interest is the effect of artificial light. Sir Sidney Harmer's researches suggest that electric incandescent lamps are only about 1/6 as injurious as diffused daylight and, therefore, very much better than direct sunlight. Hence the possibility of illuminating rooms devoted to objects with rather fugitive colors entirely by artificial light might be considered. It is true that the colors of objects seen by most artificial illuminants is materially different from that as revealed by daylight. But it is posible that this difficulty might be overcome by the use of "artificial daylight," *i. e.,* an artificial illuminant so screened that the resultant light resembles daylight very closely in color.—Indian Textile Journal.

THE LONDON STAMP EXHIBITION

In our last issue we mentioned the fact that Arthur Hind, president of the Hind & Harrison Plush Company, had received certain awards for his exhibits at the London International Stamp Exhibition. An interested reader has since advised us that we failed to give Mr. Hind all the credit due him.

As a matter of fact, Mr. Hind took two grand gold medals in two of the three championship classes; one for an exhibit of United States' stamps and the other for those of Spain. In the third championship class he received a gold medal for an exhibit of Mauritius stamps. In addition, he received a fourth grand gold medal in the rarity class where he showed, among others, the one-cent error, British Guiana, which is the only known copy in existence and for which he paid the highest price ever paid for a single postage stamp.

No one could receive more than three awards in the regular competitive classes, and Mr. Hind excelled all other exhibitors by taking two grand gold medals and one gold medal in the championship classes, in addition to the grand gold medal in the rarity class.

DU PONT ANNOUNCES PONSOL BLUE RP TRIPLE POWDER

The dyestuffs department of E. I. du Pont de Nemours & Co. announces placing on the market Ponsol Blue RP Triple Powder, which product is manufactured especially for the paper trade for use as a tinting blue for white, on high-grade paper where decided fastness to light is required.

It has the qualifications of being fast to acid and alkali, and also of having excellent resistance to chlorine.

TABLE II

	April 10 (lire)	April 10 (dollars)	May 10 (lire)	May 10 (dollars)
Acetate of alumina	1,600	82	1,600	76
Chrome alum	3,500	179	3,500	166
Bichromate of potash	5,900	302	5,900	280
Ferrous sulphate	500	25	500	23
Copper sulphate	2,360	121	2,350	111
Tartar emetic	12,000	614	12,000	571
Aniline oil	13,500	692	13,500	642
White refined glycerine	8,000	410	7,800	371
Glucose, 45 deg. Be	4,000	205	3,900	185
Hydrogen peroxide	2,100	107	2,100	100
Tannic acid, 60 per cent	20,000	1,025	20,000	952
Tartaric acid, crystals	13,500	692	13,500	642
Acetic acid, 30 per cent	2,500	128	2,500	119
Formic acid	8,500	435	8,500	404
Hydrochloric acid, 20-21 deg. Be	250	13	250	11
Lactic acid, 80 per cent	6,000	307	6,000	285
Alum	850	43	850	40
Ammonia, 22 deg. Be	1,600	82	1,850	88
Bisulphite of soda, 32 deg. Be	380	19	380	18
Chlorate of potash	3,000	153	3,000	142
Chloride of ammonia	3,000	153	3,700	176
Bleaching powder	900	46	900	42
Nitrite of soda	2,800	143	3,000	142
Yellow prussiate of potash	20,000	1,025	20,000	952
Yellow prussiate of soda	18,000	922	18,000	857
Caustic soda, 70/72	1,850	94	1,800	85
Silicate of soda, 140 deg. Be	1,000	51	1,000	47
Sodium sulphide	2,750	141	2,700	127
Logwood extract	7,500	384	6,500	309
Hematine crystals	11,000	564	10,000	476
Yellow dextrine	3,150	161	3,000	142
White dextrine	3,200	164	3,000	142
Farina	2,500	128	2,300	109
Kordofan gum	8,000	410	8,000	380
Indigo, 25 per cent	22,000	1,128	22,000	1,047
Beta-naphthol	25,000	1,282	25,000	1,190
Industrial castor oil	5,900	302	5,900	280

ITALY, SEEKING ADDITIONAL INDUSTRIAL RELATIONS, WILL BE WARY OF TREATY CHANGES

(*Concluded from page 472.*)

fair during the past seven weeks, in part owing to the exhaustion of stocks on the part of consumers and in part through a small recovery in the shipbuilding business and railway constructions that absorbed a large quantity of paint. Some of the prices are indicated in Table III.

TABLE III

	Lire per Ton April 10	Lire per Ton April 10
Zinc white	3,500— 6,000	3,500— 6,000
Lead white	4,000— 4,500	4,000— 4,500
Chrome yellow	2,800—14,000	2,800—14,000
Zinc yellow	13,000—13,500	13,000—13,500
English red	1,000— 1,500	1,000— 1,500
Red oxide of iron	1,500— 1,800	1,500— 3,000
Brown oxide of iron	900— 1,500	900— 1,500
Iron minium	1,400— 2,000	1,400— 2,000
Cinabar	6,000—50,000	6,000—50,000
Lead Minium	1,400— 3,800	1,400— 3,800
Red and yellow earths	600— 900	600— 900
Green earths	2,000— 2,500	2,000— 2,500
Paris blues	4,000—40,000	4,000—30,000
Ultramarine blues	5,000—12,000	5,000—12,000
Smoke black	5,000— 5,500	4,500— 6,000
Ivory black	3,000— 9,000	3,000— 9,000
Monaco lakes	30,000—35,000	30,000—35,000

23116

Foreign Dyes Imported Through the Port of New York During May

Including, for the First Time in These Reports, Synthetic Chemicals, Medicinals, Photographic Chemicals, Intermediates, and Other Coal-Tar Products Classified by the Tariff Act of 1922 Under Paragraphs 27 and 28

Compiled by the Chemical Division of the Bureau of Foreign and Domestic Commerce, in Collaboration with the Chemical Division of the United States Tariff Commission

KEY TO ABBREVIATIONS FOR FOREIGN MANUFACTURERS

1—The Six Leading German Companies

A—Actien-Gesellschaft fur Anilin-Fabrikation, Berlin. Founded 1873. Branches in France and Russia.

B—Badische Anilin-und Soda-Fabrik, Ludwigshafen on the Rhine. Founded 1865. Branches in France and Russia.

By—Farbenfabriken vorm. Friedr. Bayer & Co., Leverkusen on the Rhine. Founded 1862. Branches in France and Russia.

C—Leopold Cassella & Co., Frankfort on the Main. Founded 1870. Branches in France and Russia.

K—Kalle & Co., A. G., Biebrich on the Rhine. Founded 1870. Branches in Russia.

M—Farbwerke vorm. Meister Lucius & Bruning, Hochst on the Main. Founded 1862. Branches in France and Russia.

2—The Seven Smaller German Companies

BK—Leipziger Anilinfabrik Beyer & Kegel, Furstenberg near Leipzig. Founded 1882.

GG—Chemikalienwerk Greishem G.m.b.H., Griesheim on the Main. Founded 1881.

CJ—Carl Jager G.m.b.H., Anilinfarbenfabrik, Dusseldorf. Founded 1823.

GrE—Chemische Fabrik Griesheim-Electron, Offenbach on the Main. Founded 1842.

L—Farbwerk Muhlheim vorm. A. Leonhardt & Co., Muhlheim on the Main. Founded 1890. Branch in France.

tM—Chemische Fabriken vorm. Weiler ter Meer, Uerdingen on the Rhine. Founded 1877.

WD—Wulfing, Dahl & Co., A. G. Barmen. Founded 1842.

3—Dutch, Belgian and French Companies

FA—Farbwerk Ammersfoort, Ammersfoort, Netherlands. Founded 1888.

NF—Niederlandische Farbe-und Chemikalienfabrik Delft, Netherlands (Delft). Founded 1897. Branch in Russia.

LG—Lazard Godchaux, of Brussels. (These products are probably compounded largely from the dyes made by A. Wiescher & Co., of Haeren, Belgium.)

P—Societe Anonyme des Matieres colorantes et produits chimiques St. Denis (formerly A. Poirrier), St. Denis, near Paris, France. Founded 1830.

4—Swiss Companies (all at Basel)

DH—Farbwerke vorm. L. Durand, Huguenin & Co. Founded 1871. Branches in Germany and France.

G—Aniilinfarben-und Extract-Fabriken vorm. Joh. Rud. Geigy. Founded 1764. Branches in France, Germany and Russia.

I—Geselfschaft fur chemische Industrie. Founded 1885. Branch in France.

S—Chemische Fabrik vorm. Sandoz & Co. Founded 1887.

5—English Companies

BAC—The British Alizarin Co., Ltd. Established 1882.

ClCo—The Clayton Aniline Co., Ltd., Clayton, near Manchester Founded 1876.

CR—Clauss & Co. (formerly Clauss & Ree), Clayton, near Manchester. Founded 1890.

CV—Colne Vale Chemical Co., Milnsbridge, near Huddersfield.

RHS—Read Holliday & Sons, Ltd., Huddersfield. Founded 1820. (Purchases by British Dyes, Ltd.)

BD—British Dyes, Ltd. Founded 1915.

Lev—Levinstein, Ltd., Crumpsall Vale, near Manchester. Founded 1864.

Q—Importations of unknown source, through dealers in colors.

THE imports of coal-tar dyes for May totaled 254,327 pounds, with an invoice value of $292,340. The following table shows the monthly imports through the port of New York for the year 1923:

Month	Pounds	Value
January*	179,309	$185,344
February	191,709	199,640
March	312,809	301,436
April	242,022	256,751
May	254,327	292,340

*Not complete.

The five dyes leading in quantity imported were Ciba Scarlet, Ciba Bordeaux B, Alizarine Blue Black, Xylene Light Yellow 2G and Trisulphon Brown B. Of the total quantity imported in May, 1923, 39 per cent came from Switzerland, 39 per cent from Germany, 13 per cent from Italy, 5 per cent from England, 1 per cent from Canada and 3 per cent from France.

This census for the month of May includes for the first time imports for consumption of synthetic aromatic chemicals, medicinals, photographic chemicals, intermediates, and other coal-tar products classified by the tariff act of 1922 under paragraphs 27 and 28. These total 191,496 pounds in quantity, and $90,524 in value. Color lakes and bacteriological stains are not included.

The dyes in this report are grouped by Shultz numbers, and in the case of those which could not be identified by Shultz number the classification according to the ordinary method of application was adopted. As the pastes and powders of the vat dyes vary widely in strength and quantity, each vat dye has been reduced—in nearly every case—to a single-strength basis.

The designation † for competitive and * for non-competitive in column 2 indicates the appraisement basis for the assessment of the ad valorem duty in paragraph 28 of the Tariff Act of 1922. Those dyes without designation are doubtful, pending further investigation.

The ad valorem rate for competitive dyes is based on the American selling price as defined in subdivision (f) of section 402 of title IV; the ad valorem rate for non-competitive dyes is based on the United States value as defined in subdivision (d) of section 402 of title IV of the Tariff Act of 1922.

The designation BAC, used to identify a manufacturer for the first time in these reports, represents the British Alizarin Company, Ltd., established 1882.

(*Denotes classification as non-competitive; †denotes classification as competitive.)

Schultz No.	Name of Dye and Manufacturer	Quantity (pounds)
14	Diphenyl Chrysoine GC 120—(G)	3,748
22	†Xylene Light Yellow 2G Conc.—(S)	5,000
118	*Geranine G—(By)	46
121	*Erica B Extra—(Q)	715
158	Chrome Brown RVV 899—(G)	999
207	Diphenyl Fast Brown GXG 129—(G)	2,000
220	Palatine Black—(A)	2,500
	Wool Jet Black 3B (old)—(A)	
	Wool Black RF—(A)	
257	†Cloth Fast Blue R—(I)	222
266	Naphthylamine Black 6B—(By)	298
273	Diaminogene Blue	3,551
	*Diaminogene Blue NA—(C)	
	Blue NA Standard—(C)	
274	Diaminogene	1,299
	Diaminogene Extra—(Q)	
	Diazo Indigo Blue 2RL—(By)	
283	Vesuvine 3R Surfine—(M)	110
303	Brilliant Yellow—(By)	1,001
322	Trisulphon Violet B—(S)	500
330	*Zambesi Brown 4R—(A)	50
358	Diphenyl Red	2,687
	*Chloramine Red 8BS—(By)	
	*Chloramine Red 8BS—(Q)	
	*Aceto Purpurine 8B—(A)	
364	*Diazo Brilliant Black B—(By)	500
436	Patent Dianil Black FF Conc.—(M)	25
449	*Trisulphon Brown B Conc.—(S)	5,000
456	*Benzo Fast Blue 4GL—(By)	1,057
494	Auramine G437—(G)	2,205
496	Setoglaucine 753—(G)	838
500	*Setopaline Conc. 707—(G)	661
503	Neptune Green	1,082
	Brilliant Acid Green 6B—(By)	
	Erio Viridine B Supra 561—(G)	
512	Magenta Small Crystals—(M)	143
516	†Crystal Violet Powder—(B)	110
523	*Fast Green Extra Bluish—(By)	1,101
531	Erio Cyanine	1,992
	Erio Cyanine AC503—(G)	
	Erio Cyanine A665—(G)	
537	Methyl Lyons Blue 410—(G)	558
539	Soluble Blue—(B)	110
543	Patent Blue	3,402
	*Patent Blue V—(M)	
	*Brilliant Acid Blue V—(By)	
546	Cyancl	4,440
	*Cyancl Extra—(C)	
	Blue FF Standard 100%—(C)	
	Blue Extra Standard 100%—(C)	
555	Aurine 100%—(Q)	560
564	Naphthalene Green	4,537
	Kiton Fast Green VX Conc.—(I)	
	†Erio Green BB Supra 661—(G)	
	Naphthalene Green V 100%—(Q)	
571	Rhodamine 6G	3,656
	Rhodamine 6GDN Extra—(Q)	
	*Rhodamine 6G Extra—(I)	
	*Rhodamine 6GDN Extra 99.6%—(B)	
	Rhodamine 6GD Extra—(M)	
	*Rhodamine 6GDN Extra—(B)	
	*Rhodamine 6GDN Extra—(M)	
	*Rhodamine 6GDN Extra Conc.—(B)	
	*Rhodamine 6GDN Extra 500%—(B)	
	*Rhodamine 6GDN—(BD)	
573	Rhodamine B	1,763
	†Rhodamine B Extra—(I)	
	†Rhodamine B Extra 500%—(I)	
574	Rhodamine 3B Extra 500%—(I)	110
601	Coeruleine S Pdr. (standard)—(Q)	175
602	Acridine Golden Yellow—(L)	220
603	*Acridine Orange DHE 95%—(DH)	2,205
608	*Euchrysine GRNTN 100%—(B)	1,556
	*Euchrysine GRNTN 85%—(B)	
609	Auracine G Conc. 65%—(By)	265
613	Quinoline Yellow O—(M)	25
618	*Thioflavine T—(C)	3,268
	*Thioflavine TCN—(C)	
	*Thioflavine T 100%—(Q)	
658	Gallophenin—(By)	1,116
681	†New Fast Gray—(By)	500
705	*Acid Cyanine BF 49%—(A)	1,000
735	†Pyrogene Indigo 125%—(I)	1,102
759	Anthraflavone G Paste (single)	1,796
	*Anthraflavone GC Paste—(B)	
	*Anthraflavone GC Paste—(By)	
	*Anthraflavone GC Powder—(Q)	
760	*Indanthrene Golden Orange Dble. Paste Fine—(B)	1,000
765	Indanthrene Blue Green B Dble. Paste Fine—(B)	400
767	Indanthrene Violet RR Single Strength.	1,320
	†Indanthrene Violet RR Ex. Pst.—(B)	
	†Indanthrene Violet RR Ex. Pdr.—(B)	
774	†Alizarine Black S Paste for Cotton 25%—(B)	941
779	†Alizarine Orange 20%—(BAC)	5,212
780	Alizarine Red	1,662
	†Alizarine Red XGP Paste 20%—(By)	
	*Alizarine Red IWS Pdr. 90%—(M)	
782	†Anthracene Brown RD Paste—(G)	1,808
785	Alizarine RGGI	1,767
	†Alizarine YCA 20%—(BAC)	
	†Alizarine Red YCA 20%—(BAC)	
794	*Cibanone Black B Paste 10%—(I)	551
795	*Cibanone Yellow R Paste 10—(I)	220
808	*Alizarine Green S 15%—(BAC)	368
811	Algol Yellow 3G Powder—(By)	192
818	Algol Pink R Powder 80%—(By)	40

Schultz No.	Name of Dye and Manufacturer	Quantity (pounds)
819	Algol Red FF	3,085
	*Algol Brilliant Red 2B Pdr.—(By)	
	*Algol Red FF Extra Pdr.—(By)	
	*Algol Bril. Red 2B Ex. Pdr.—(By)	
	*Algol Red FF Ex. Pst.—(Q)	
	*Algol Brilliant Red 2B Pdr.—(By)	
820	Algol Brilliant Violet R Pdr.—(By)	4,604
	Indanthrene Brilliant Violet RN Paste —(By)	
822	Algol Brilliant Orange FR Pdr.—(By)	480
827	*Indanthrene Bordeaux B Ex. Pst.—(B)	1,551
831	Indanthrene Red BN (single strength)	1,543
	*Indan. Red BN Ex. Pst.—(B)	
	Indan. Red BN Ex. Pdr.—(B)	
840	†Indanthrene Blue 3G Powder—(B)	1,060
842	†Indanthrene Blue GCD Dble. Pst.—(B)	4,296
844	†Algol Blue 3G Paste—(By)	275
849	†Indanthrene Yellow G Dble. Pst.—(B)	550
850	Indanthrene Blue WB Pdr. (not converted to paste)—(B)	1,213
851	Alizarine Direct Blue B—(M)	80
852	Alizarine Irisol DR	1,192
	Alizarine Irisol R Powder—(By)	
	Alizarine Direct Violet R—(M)	
855	*Alizarine Sky Blue B Powder—(By)	1,330
856	Alizarine Astrol	550
	*Alizarine Astrol B Powder—(By)	
	*Alizarine Astrol B—(By)	
858	Alizarine Saphirol B	2,647
	Alizarine Saphirol SE Powder—(By)	
	†Alizarine Saphirol SE—(By)	
	†Alizarine Saphirol WSA Pdr.—(By)	
	Alizarine Saphirol WSAX—(By)	
	†Alizarine Saphirol B—(By)	
	†Helio Fast Blue BL—(By)	
859	*Cynanthrol RXO—(Q)	110
860	*Cynanthrol BGAOO—(B)	272
862	Alizarine Blue Black	10,648
	†Alizarine Blue Black B Pdr.—(M)	
	†Alizarine Blue Black B Pdr.—(By)	
	†Alizarine Blue Black B—(By)	
	Alizarine Blue Black 3B Pdr.—(By)	
864	*Anthraquinone Green GXNO—(B)	280
865	Alizarine Cyanine Green	742
	†Alizarine Cyanine Green G—(By)	
	*Aliz. Cyanine Green 3G Pdr.—(By)	
	Aliz. Cya. Green G Ex. Pdr.—(By)	
868	Cibanone Brown	882
	Cibanone Brown B Powder—(I)	
	*Cibanone Brown R Paste—(I)	
869	Algol Brown	374
	Algol Brown R Powder—(By)	
	*Algol Brown R Paste—(By)	
893	Alizarine Indigo G Paste—(By)	2,646
901	*Ciba Violet B Paste 10%—(I)	2,204
907	Ciba Scarlet	12,203
	*Ciba Scarlet G Extra Paste—(I)	
	Ciba Scarlet G Extra Powder—(I)	
	Helindone Fast Scarlet C Paste—(M)	
910	Helindone Pink	662
	Helindone Pink BN—(M)	
	*Helindone Pink BN Paste—(M)	
913	*Helindone Orange R Powder—(M)	1,120
919	Ciba Bordeaux B (single strength)—(I)	11,020
920	Helindone Violet R Powder—(M)	440
923	Nako Fur Dye—(M)	1,671
	Nako DR—(M)	
	Nako RH—(M)	
	Nako 3GA—(M)	
	Nako PS—(M)	
	Nako Black D2B—(M)	
	Nako Black O—(M)	
	Nako Yellow SEL—(M)	

UNIDENTIFIED ACID DYES

Name of Dye and Manufacturer	Quantity (pounds)
*Acid Milling Black B652—(G)	3,968
Acid Milling Red R Conc.—(G)	110
Acid Rhodamine	257
Acid Rhodamine G—(Q)	
*Acid Rhodamine BG—(B)	
Alizarine Emeraldole Green G—(Q)	10
*Alizarine Rubinol R Powder—(By)	
*Alizarine Rubinol GW Powder—(By)	
Alizarine Rubinol 3G Powder—(By)	
†Azo Wool Violet R—(C)	500
Brilliant Milling Red R—(C)	300
*Brilliant Pure Yellow 6G Extra—(Q)	110
Guinea Fast Red	2,500
*Guinea Fast Red BL—(A)	
Guinea Fast Red 2BL—(A)	
*Kiton Fast Green A Conc.—(I)	992
Polar Red G Conc. 596—(G)	1,984
Polar Yellow 2G Conc. 602—(G)	1,984

UNIDENTIFIED DIRECT DYES

Name of Dye and Manufacturer	Quantity (pounds)
*Benzo Bordeaux 6BL—(By)	200
Benzo Brilliant Fast Violet 2RL—(By)	110
Benzo Fast Brown	661
Benzo Fast Brown 3GL—(Q)	
Benzo Fast Brown 3G—(By)	
Benzo Fast Bordeaux 6BL—(By)	440
Benzo Fast Orange	770
†Benzo Fast Orange S—(By)	
*Benzo Fast Orange 2RL—(Q)	
Benzo Fast Violet BL—(By)	123
*Benzo Light Blue 2GL—(Q)	220
Benzo Light Bordeaux 6BL—(Q)	220
*Benzo Light Gray BL—(By)	1,671

Name of Dye and Manufacturer	Quantity (pounds)
*Brilliant Benzo Violet B—(Q)	1,100
*Brilliant Benzo Fast Violet 2RL—(By)	108
*Brilliant Sky Blue 8G Extra—(By)	220
Chlorantine Fast Brown RL—(I)	551
†Chlorantine Fast Yellow 4GL—(I)	772
†Diamine Catechine B—(C)	400
Diamine Fast Orange	1,770
†Diamine Fast Orange ER—(C)	
Diamine Fast Orange EG—(C)	
Dianil Chrome Brown G—(M)	100
*Diamine Fast Brown R—(C)	529
Dianil Fast Blue GL—(M)	100
Dianil Light Red 8BL—(M)	100
Dianil Fast Orange RR—(M)	100
Dianil Fast Violet BL—(M)	110
*Diazo Brilliant Green 3G—(By)	110
*Diazo Fast Violet BL—(By)	110
Chlorantine Fast Orange TRL—(I)	441
†Chrysamine KS Standard—(S)	882
*Diamine Fast Bordeaux 6BS—(C)	378
*Diamine Fast Orange ER—(C)	1,000
*Diamine Fast Scarlet GS—(C)	55
Diamine Orange B—(C)	500
Diazo Indigo Blue	1,051
*Diazo Indigo Blue 4GL Extra—(By)	
Diazo Indigo Blue 2RL—(By)	
Diazo Brilliant Orange GR Extra—(By)	220
Diazo Brown 3G—(By)	319
Diazanil Scarlet 3BA Conc.—(M)	135
Diazogene Red B Powder—(K)	550
Diphenyl Brown GS195—(G)	999
†Fast Cotton Blue FF—(A)	500
Naphthylamine Black	165
*Naphthylamine Black—(By)	
*Naphthylamine Black 4B—(By)	
Pyrazol Orange	3,798
Pyrazol Orange Conc.—(S)	
Pyrazol Orange R Conc.—(S)	
†Pyrazol Orange RR Conc.—(S)	
Toluylene Fast Orange GH—(GrE)	44
*Zambesi Pure Blue 4BG—(A)	100

UNIDENTIFIED BASIC DYES

Name of Dye and Manufacturer	Quantity (pounds)
Basic Yellow	1,300
*Basic Yellow T Standard—(C)	
Basic Yellow TCN—(C)	
Brilliant Cotton Blue	420
Brilliant Cotton Blue 6B Conc.—(K)	
Brilliant Cotton Blue R Conc. Pdr.—(K)	
Flavophosphine GO—(M)	500
Rhodamine 4GDN Extra—(Q)	110
Yellow 6GT—(By)	500

UNIDENTIFIED VAT DYES

Name of Dye and Manufacturer	Quantity (pounds)
Algol Brilliant Pink FF Paste—(By)	2,028
*Algol Brown G Paste—(By)	110
Helindone Black Paste—(M)	428
Helindone Golden Orange DJG Paste—(M)	441
*Helindone Golden Orange IG Paste—(M)	1,595
*Helindone Golden Orange IRRT Paste—(M)	2,440
*Helindone Pink R Extra Paste—(M)	2,194
Helindone Violet IRRT Paste—(M)	1,154
Hydron Brown R Paste—(C)	100
*Hydron Orange R Paste—(C)	110
Hydron Pink—(C)	1,394
*Hydron Pink FF Paste	
*Hydron Pink FF Powder	
Hydron Scarlet	1,011
*Hydron Scarlet 2B Paste	
*Hydron Scarlet 3B Paste	
Hydron Scarlet 2B Powder	
*Indanthrene Blue 5G Paste—(By)	1,001
*Indanthrene Blue 3GT Paste—(By)	10
*Indanthrene Brown G Paste—(By)	2,299
Indanthrene Brown—(By)	4,556
*Indanthrene Brown R Paste—(By)	
*Indanthrene Brown R Powder—(By)	
Indanthrene Orange 6RTK Powder—(By)	792
Indanthrene Brilliant Violet—(By)	3,399
*Indanthrene Brilliant Violet BBK Paste	
*Indanthrene Brilliant Violet RK Paste	
Indanthrene Corinth RK Paste—(By)	399
Indanthrene Violet	1,722
Indanthrene Violet BN Extra Paste—(B)	
*Indanthrene Violet BN Paste—(B)	
Indanthrene Violet—(Q)	
Indanthrene Yellow	1,232
Indanthrene Yellow GK Powder—(By)	
Indanthrene Yellow G Double Paste—(B)	
Thio Indigo Rose RN Extra Paste—(K)	827
Vat Brilliant Red 2B Paste—(By)	1,001
Vat Brilliant Violet RK Paste—(By)	399
*Helindone Golden Or. IRRT Pst. 10%—(M)	110

UNIDENTIFIED MORDANT AND CHROME DYES

Name of Dye and Manufacturer	Quantity (pounds)
*Acid Alizarid Gray G—(M)	1,124
Alizarine Cyclamine R Paste—(By)	399
Alizarine Green C Pdr. Sol. in Oil—(By)	99
†Alizarine Light Blue B Conc.—(S)	882
*Chromoxane Violet R—(By)	99
Chromorhodine	551
Chromorhodine 6GN Extra—(DH)	
Chromirhodine BN—(DH)	
Metachrome Olive Brown	1,100
Metachrome Olive Brown B—(A)	
*Metachrome Olive Brown G—(Q)	

Name of Dye and Manufacturer	Quantity (pounds)
Modern Gray RCN—(DH)	110
Omega Chrome Brown	3,809
Omega Chrome Brown G. Conc.—(S)	
Omega Chrome Brown PB Conc.—(S)	

UNIDENTIFIED COLOR LAKE DYES

Name of Dye and Manufacturer	Quantity (pounds)
Helio Red	769
Helio Red RM Powder—(By)	
Helii Red RMT Powder—(By)	
*Stone Fast Orange R Powder—(B)	110
(Lithol Fast Orange R Powder)	

UNIDENTIFIED SULPHUR COLORS

Name of Dye and Manufacturer	Quantity (pounds)
Pyrogene Cutch Brown 2R—(I)	1,885
Thional Yellow 2G—(S)	4,204

UNIDENTIFIED, UNCLASSIFIED

Name of Dye and Manufacturer	Quantity (pounds)
Anthrarubine B Powder—(K)	110
Cashmere Black TN—(By)	55
†Fur Black DG—(A)	50
†Fur Blue Black A—(A)	200
*Fur Brown 4R Paste—(A)	400
*Fur Gray ALW—(A)	200
*Paper Fast Bordeaux B—(By)	1,523
Violet PDH Powder—(DH)	220

SYNTHETIC AROMATIC CHEMICALS OF COAL-TAR ORIGIN IMPORTED FOR CONSUMPTION DURING MAY, 1923

Name of Chemical	Quantity (pounds)
Amyl Salicylate	6
Benbyl Acetate	220
Benzyl Acetate Extra	110
Benzyl Benzoate Pure	200
Beta Naphthol Methyl Ether (Yara Yara)	50
Irdol	3
Iso Butyl Benzoate	11
Methyl Acetophenone	261
Methyl Antamanilate	460
Methyl Methyl Antmanilate	44
Methyl Cinnamate	35
Methyl Para Cresol	20
Methyl Phenyl Acetate	25
Paracresol Acetate	20
Phenyl Acetic Aldehyde	491
Phenyl Ethyl Alcohol	691
Phenyd Propyl Alcohol	10
Musk Ketone	194
Musk Ambrette	50

MEDICINALS, PHOTOGRAPHIC DEVELOPERS AND OTHER COAL-TAR CHEMICALS

Name of Chemical	Quantity (pounds)
Benzoyl Peroxide	5
Beta Naphthol Monosulphonic Acid	298
Carbolic Ice Crystals	672
Cresylic Acid	57,243 (and 113,520 gallons)
Cresol U. S. P.	200
Dimethyl Glyoxine	25
Diphemylamine C. P. Crystals	20
Mono Ethyl Aniline C. P.	11
Guaiacol Carbonate	420
Para Cresol	224
Resorcinol Technical	8,960
Amidopyrene	1,800
Developer 2	299
Diamidophenol Hydrochloride	369
Mono Methyl Paramido Phenol Sulphate	200
Mono Methyl Para Amido Phenol Sulphate	55
Para Amino Phenol Hydrochloride Potassium Salt	94
Katanol	4,205
Epinine	15.25
Total	191,496

NEW DYE PROCESS SUCCESSFULLY TRIED ON COTTON GOODS IN LONDON

Burgess, Ledward & Co., Ltd., dress goods manufacturers, with headquarters at 22 Dickinson Street, Manchester, and factories in Manchester, Leeds and Bradford, staged at the British Drapery Exhibition, which was recently held in New York City, an exhibit of their quiques, cambrics, ratines and zephyrs, which had been dyed in accordance with the new secret process invented by British chemists. The materials were boiled during the fortnight's demonstration in a mixture of soap and soft water without fading in the slightest degree, thereby proving that the fabrics are unaffected by sunlight and sea air bleaching.—Daily News Record.

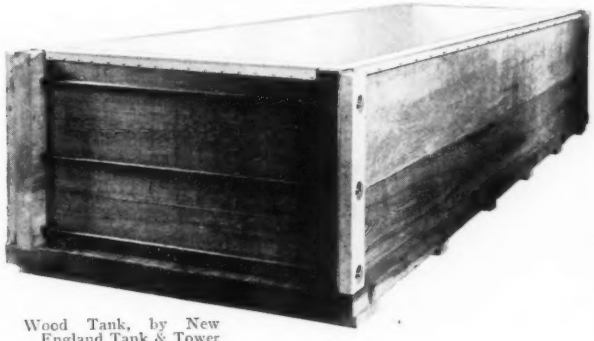
The Doris Silk Hosiery Company, 317 Governor Street, Paterson, N. J., recently incorporated to manufacture silk and other textiles; capital, $100,000. Incorporators are Frank Nobis, Frank J. Vannoort, William Vannoort and Michael Keller, all of Paterson.

The Durham Hosiery Mills for 1922 report gross sales of $5,813,582 and operating income, after all expenses, of $625,160. After crediting other income and allowing for interest and depreciation, net profits were $321,799. After payment of $233,485 for preferred dividends, there was a surplus of $88,314.

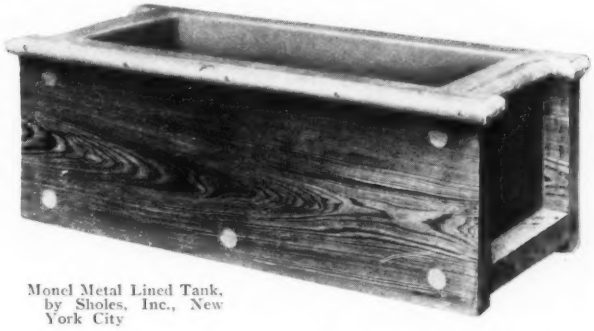
The De Grado Silk Dyeing Company, Paterson, N. J., is building a frame and brick dyehouse, to cost approximately $10,000.

To permit dyeing all colors in the same tank— Line your wood tanks with Monel Metal

Tank with Monel Metal Lining, by Smith, Drum & Co., Philadel-;phia, Pa.



Wood Tank, by New England Tank & Tower Co., Boston, Mass., lined with Monel Metal by Beckley Perforating Co., Garwood, N. J.



Monel Metal Lined Tank, by Sholes, Inc., New York City

ALL colors can be consecutively handled in the same tank if it is Monel Metal lined. And the same tank can be used for bleaching, if desired. The great ease of cleaning Monel Metal also allows frequent change of batches without loss of time.

Proof against the acid and alkaline solutions used in dyeing and bleaching, Monel Metal tank linings last indefinitely. Thus the necessity for frequent tank renewals, and the interruptions of operation during replacements, are eliminated. Monel Metal tank linings pay big returns on the investment.

For lower annual equipment costs —for reduction of floor space occupied and greater flexibility of output— **line** your tanks with Monel Metal.

Get the quotation of sheet metal workers in your vicinity on lining ***your*** tanks. Write for our list of concerns thoroughly experienced in this work— concerns who have lined tanks for hundreds of textile mills.

Bulletin 103,
Textile Applications of Monel Metal,
sent on request.

THE INTERNATIONAL NICKEL COMPANY
67 WALL STREET NEW YORK

INCo Monel metal

S. R. DAVID & COMPANY
INCORPORATED

Dyestuffs

252 Congress Street, Boston, Mass.
Hartford Office: 1029 Main Street
Tel. Main 1684

RÖHM & HAAS CO.

Manufacturers of
CHEMICALS

40 North Front St., Philadelphia, Pa.

SPECIALTIES

LYKOPON—Concentrated Hydrosulphite for reducing Indigo and vat dyes.
FORMOPON—For discharge work.
FORMOPON EXTRA—For Stripping.
INDOPON W—Indigo Discharge Assistant.
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CHEMICALS

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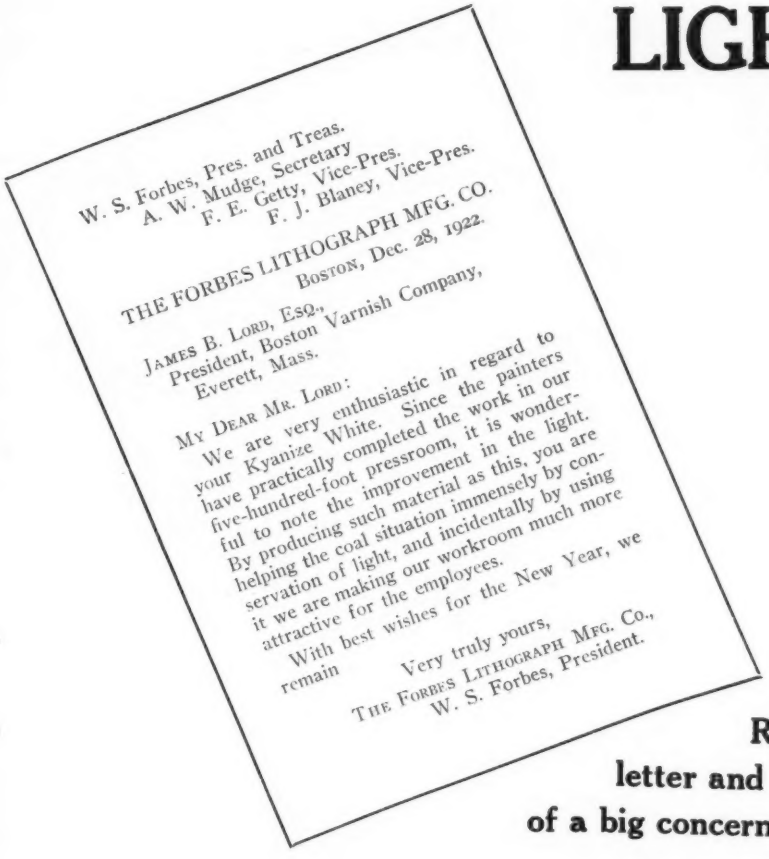

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